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TRANSACTIONS

OF THE

Indiana Horticultural Society

119431

FOR THE YEAR 1901,

BEING A

REPORT OF THE FORTY-FIRST ANNUAL MEETING

HELD IN THE CITY OF INDIANAPOLIS DECEMBER 5 AND 6, 1901,

TOGETHER WITH

Reports of the Summer Meetings Held in Orleans, August 20 and 21, South Bend, August 22 and 23, and of Local Societies, Selected Papers, etc.

BY W. B. FLICK, SECRETARY.

INDIANAPOLIS:
WM. B. BURFORD, CONTRACTOR FOR STATE PRINTING AND BINDING.
1902.

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LETTER OF TRANSMITTAL.

To His Excellency, Hon. Winfield T. Durbin,
Governor of Indiana:

Sir—In accordance with the requirements of law, I have the honor to herewith present you with the forty-first annual volume of transactions of the Indiana Horticultural Society, together with such other papers as seem to be appropriate for publication in this connection.

Respectfully,

W. B. FLICK,
Secretary.

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THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT,
June 3, 1902.

Received by the Governor, examined and referred to the Auditor of State for verification of the financial statement.

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, June 3, 1902.

The within report, so far as the same relates to moneys drawn from the State Treasury, has been examined and found correct.

W. H. HART,
Auditor of State.

June 3, 1902.

Returned by the Auditor of State, with the above certificate, and transmitted to Secretary of State for publication, upon the order of the Board of Commissioners of Public Printing and Binding.

CHAS. E. WILSON,
Private Secretary.

Filed in the office of the Secretary of State of the State of Indiana, June 7, 1902.

UNION B. HUNT,
Secretary of State.

Received the within report and delivered to the printer this 7th day of June, 1902.

THOS. J. CARTER,
Clerk Printing Bureau.

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OFFICERS OF THE SOCIETY FOR 1901-1902.

PRESIDENT,

W. W. STEVENS, Salem.

FIRST VICE-PRESIDENT,

E. B. DAVIS, Cartersburg.

VICE-PRESIDENT FOR SOUTHERN DISTRICT,

E. M. C. HOBBS, Salem.

VICE-PRESIDENT FOR SOUTH-CENTRAL DISTRICT,

W. C. REED, Vincennes.

VICE-PRESIDENT FOR NORTHERN DISTRICT,

J. C. GROSSMAN, Wolcottville.

SECRETARY,

W. B. FLICK, Lawrence.

TREASURER,

SYLVESTER JOHNSON, Irvington.

EXECUTIVE COMMITTEE,

JOE A. BURTON, Orleans.
JAMES TROOP, Lafayette.
H. H. SWAIM, South Bend.

SUPERINTENDENT EXPERIMENTAL ORCHARD,

JOE A. BURTON, Orleans.

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OFFICERS OF THE INDIANA HORTICULTURAL SOCIETY SINCE ITS ORGANIZATION IN 1860.

Date.	President.	First Vice-President.	Secretary.	Treasurer.
1860	*Reuben Ragan	William Miller	Wm. H. Loomis	John C. Teas.
1861-2	*John A. Matson	*William Miller	*Wm. H. Loomis	John C. Teas.
1863	I. D. G. Nelson	Joseph Orr	Geo. M. Beeler	John C. Teas.
1864	I. D. G. Nelson	Joseph Orr	Geo. M. Beeler	John C. Teas.
1865	I. D. G. Nelson	Joseph Orr	Geo. M. Beeler	Calvin Fletcher.
1866	I. D. G. Nelson	*Joseph Orr	*Geo. M. Beeler †Samuel V. Morris	Calvin Fletcher.
1867	I. D. G. Nelson	Allen Furnas	Seth W. Pearson ‡Joseph Gilbert	J. S. Dunlop.
1868	I. D. G. Nelson	*Allen Furnas	Seth W. Pearson ‡Joseph Gilbert	*J. S. Dunlop.
1869	*I. D. G. Nelson	S. Burnett	T. A. Bland ‡W. H. Ragan	Charles Lowder.
1870	Allen Furnas	J. C. Ratliff	Seth W. Pearson ‡W. H. Ragan	Charles Lowder.
1871	Allen Furnas	J. C. Ratliff	W. H. Ragan	Charles Lowder.
1872	J. C. Ratliff	I. S. Jessup	W. H. Ragan	Charles Lowder.
1873	J. C. Ratliff	I. S. Jessup	J. G. Kingsbury	Charles Lowder.
1874	J. C. Ratliff	*I. S. Jessup	W. H. Ragan	Charles Lowder.
1875	Joseph Gilbert	J. A. Mendenhall	W. H. Ragan	Charles Lowder.
1876	Joseph Gilbert	*J. A. Mendenhall	W. H. Ragan	Charles Lowder.
1877	Sylvester Johnson	J. M. Bulla	W. H. Ragan	Daniel Cox.
1878	Sylvester Johnson	J. M. Bulla	W. H. Ragan	Daniel Cox.
1879	Sylvester Johnson	*J. M. Bulla	W. H. Ragan	Daniel Cox.
1880	Sylvester Johnson	S. Burnett	W. H. Ragan	Daniel Cox.
1881	Sylvester Johnson	*S. Burnett	W. H. Ragan	Daniel Cox.
1882	Sylvester Johnson	J. B. Elliott	W. H. Ragan	Daniel Cox.
1883	Sylvester Johnson	C. M. Hobbs	‖W. H. Ragan †C. M. Hobbs	Daniel Cox.
1884	Sylvester Johnson	E. Y. Teas	C. M. Hobbs	Daniel Cox.
1885	Sylvester Johnson	E. Y. Teas	C. M. Hobbs	Daniel Cox.
1886	Sylvester Johnson	E. Y. Teas	C. M Hobbs	Daniel Cox.
1887	Sylvester Johnson	E. Y. Teas	C. M. Hobbs	Daniel Cox.
1888	Allen Furnas	W. A. Workman	C. M. Hobbs	Daniel Cox.
1889	*Allen Furnas	J. C. Stevens	C. M. Hobbs	Daniel Cox.
1890	J. C. Ratliff	Joe A. Burton	C. M. Hobbs	*Daniel Cox. †S. Johnson.
1891	E. J. Howland	Joe A. Burton	W. H. Ragan	W. A. Workman.
1892	E. J. Howland	E. Y. Teas	W. H. Ragan	W. A. Workman.
1893	C. M. Hobbs	E. Y. Teas	W. H. Ragan	W. A. Workman.
1894	C. M. Hobbs	E. Y. Teas	W. H. Ragan	F. Beeler, Sr.
1895	C. M Hobbs	E. Y. Teas	W. H. Ragan	*F. Beeler, Sr.
1896	C. M. Hobbs	E. Y. Teas	Jas. Troop	Isham Sedgwick.
1897	C. M. Hobbs	E. Y. Teas	Jas. Troop	Isham Sedgwick.
1898	C. M. Hobbs	E. Y. Teas	Jas. Troop	Sylv. Johnson.
1899	C. M. Hobbs	E. Y. Teas	Jas. Troop	Sylv. Johnson.
1900	C. M. Hobbs	Mrs. W. W. Stevens	Jas. Troop	Sylv. Johnson.
1901	C. M. Hobbs	Mrs. W. W. Stevens	Jas. Troop	Sylv. Johnson.
1902	W. W. Stevens	E. B. Davis	W. B. Flick	Sylv. Johnson.

* Deceased. † Appointed to vacancy. ‡ Corresponding Secretary. ‖ Resigned.

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CONSTITUTION AND BY-LAWS

OF THE

Indiana Horticultural Society.

CONSTITUTION.

Article I. This organization shall be known as the Indiana Horticultural Society.

Article II. The objects of the Society are to develop facts and promulgate information pertaining to the science and art of horticulture.

Article III. Its officers shall consist of a President, four Vice-Presidents, Secretary, Treasurer and Executive Committee of three.

Article IV. Its members shall consist of annual members, paying a fee of one dollar per annum into the treasury of the Society, and honorary members, who shall be elected by the Society for merit as horticulturists of distinction, who may, at pleasure, participate in the deliberations of the Society. Members' wives will be members without fee.

Article V. Each member shall be entitled to a copy of the transactions of the Society as often as the same shall be published.

Article VI. The Treasurer shall not disburse money except on the order of the Secretary, countersigned by the President.

Article VII. The Executive Committee shall require of the Treasurer such security as may be deemed sufficient for the safe keeping of the funds of the Society.

Article VIII. The seal of the Society shall consist of an outer rim, embracing the inscription, "Indiana Horticultural Society;" within this, and above the central figure, consisting of a vase of flowers, a pear and apple resting upon a section of vine with its fruit, the words, "Organized 1860;" below, "Incorporated 1875."

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BY-LAWS.

I. The President shall preside at all meetings of the Society; he, together with the Secretary, shall have power to call meetings of the Executive Committee; he shall present to the Society in his annual address such suggestions and recommendations as may seem appropriate, and shall appoint all special committees unless otherwise directed by the Society.

II. The Vice-Presidents shall be designated as 1st, 2d, 3d and 4th, one of whom, in the order named, shall preside in the absence of the President, and each shall be elected to represent his respective district, said districts to be determined by an apportionment to be made by the Society, to be known as the Southern, the South-Central, the North-Central and the Northern districts. Each Vice-President shall make annual reports to the Society, embracing such suggestions and recommendations as may to him seem best for the promotion of the horticultural interests of said district, and he shall give such attention to the organization and building up of local societies in his district as may be within his power.

III. The Secretary shall record all the doings of the Society, collate and prepare all communications, etc., for the public press, and pay over all moneys received from members, or otherwise, to the Treasurer, on his receipt; shall receive and answer all communications addressed to the Society; establish and maintain correspondence with all local, county, district and State horticultural societies, and secure by exchange their transactions, as far as possible, to aid the President, as an executive officer, in the dispatch of business relating to the meetings of the Society, preparing and publishing circulars and notices of horticultural and similar meetings of general interest, and report to the annual meeting of the Society an abstract of the matter that has come into his possession, which, with its approval, shall become part of the transactions for the current year. He shall also act as librarian for the Society, and shall have the care and custody of its room and its property, under such regulations as may be adopted for the government thereof.

IV. The Treasurer shall receive and hold all funds of the Society, paying out the same only as prescribed by the Constitution. Before entering upon his duties he shall give bond to the Society in the sum of two thousand dollars ($2,000) for the faithful performance of such duties.

V. The officers shall be elected annually, by a ballot vote, and shall serve until their successors are elected and qualified.

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VI. The objects of the Society being to collect, condense and collate information relative to varieties of fruits and other horticultural products, and dispense the same among the people of the State, every member shall pay into the treasury one dollar a year for the purpose of publishing and other expenses: Provided, That the members of local horticultural societies may become members by paying into the treasury, through their respective local organizations, the sum of fifty cents each. Any person interested in horticulture may become a member by forwarding to the Treasurer or Secretary the fee of membership.

VII. The President, Secretary and Executive Committee may call a meeting of the Society at any time and place they may consider advisable by a notice of thirty days in the public press, or by circulars properly distributed.

VIII. This Society shall hold an annual meeting* on the first Wednesday after the first Monday in December of each year, and at such place as the Society shall designate at its previous meeting, and semi-annual and called meetings may be held as provided for in the preceding section.

IX. The officers of this Society shall constitute a Board of Horticulture, five of whom shall be a quorum for the transaction of business, the officers of the Society to be officers of the Board, said Board to meet immediately on the adjournment of the Society, and afterward on its own adjournment. It shall be the duty of the Board of Horticulture to investigate all accounts or claims against the Society, when presented for payment; to collect horticultural information, for which it may employ an agent, or agents, to visit different portions of this or adjoining States, and may draw on the treasury for money to pay the necessary expenses, when there is money in the treasury not otherwise needed, and said Board shall make full and definite report of its proceedings to the next regular meeting of the Society.

X. These by-laws may be amended and otherwise changed at any regular meeting of the Society by a majority vote.

XI. The following named counties shall constitute the several Vice-Presidents' districts: The Southern District shall include the counties of Crawford, Clark, Dubois, Floyd, Gibson, Harrison, Jefferson, Ohio, Orange, Perry, Pike, Posey, Scott, Spencer, Switzerland, Vanderburgh, Warrick and Washington. The South-Central District shall include the counties of Bartholomew, Brown, Clay, Daviess, Dearborn, Decatur, Fayette, Franklin, Greene, Jackson, Jennings, Johnson, Knox, Lawrence, Martin, Monroe, Morgan, Owen, Ripley, Rush, Shelby, Sullivan, Union and Vigo.

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* The Executive Committee was instructed to fix the date of the meeting for 1901.

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The North-Central District shall include the counties of Benton, Blackford, Boone, Cass, Carroll, Clinton, Delaware, Fountain, Grant, Hamilton, Hancock, Hendricks, Henry, Howard, Jay, Madison, Marion, Montgomery, Parke, Putnam, Randolph, Tippecanoe, Tipton, Vermillion, Warren and Wayne. And the Northern District shall include the counties of Adams, Allen, Dekalb, Elkhart, Fulton, Huntington, Jasper, Kosciusko, Lagrange, Lake, Laporte, Marshall, Miami, Newton, Noble, Porter, Pulaski, Starke, Steuben, St. Joseph, Wabash, Wells, White and Whitley.

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LIST OF MEMBERS

OF THE

Indiana Horticultural Society

FOR 1900–1901.

LIFE MEMBERS.

Name.	*Postoffice.*	*County.*
Burton, Joe A	Orleans	Orange.
Butler, Prof. A. W	Indianapolis	Marion.
Conley, John	Richmond	Wayne.
Cowing, Granville	Muncie	Delaware.
Fletcher, Calvin	Indianapolis	Marion.
Hobbs, C. M	Bridgeport	Marion.
Kane, Morgan	Mitchell	Lawrence.
Morris, Thomas B	Richmond	Wayne.
Ragan, W. H	Washington, D. C., Dept. of Agriculture.	
Ratliff, Joseph T	Richmond	Wayne.
Shanklin, A. T	Cutler	Carroll.
Teas, E. Y	Green's Fork	Wayne.
Woods, Arthur Earle	Pecksburg	Putnam.

HONORARY MEMBERS.

Name.	*Postoffice.*	*County.*
Bailey, Dr. L. H	Ithaca, N. Y.	
Beach, Prof. S. A	Geneva, N. Y.	
Bennett, Mrs. Emeline	New Amsterdam	Harrison.
Burrill, Prof. T. J	Champaign, Ill.	
Craig, Prof. John	Ithaca, N. Y.	
Dunlap, H. M	Savoy, Ill.	
Dunlap, Mrs. H. M	Savoy, Ill.	
Farnsworth, W. W	Waterville, Ohio.	
Garfield, Charles W	Grand Rapids, Mich.	
Green, Prof. W. J	Wooster, Ohio.	
Hale, J. H	South Glastonbury, Conn.	
Keach, J. L	Indianapolis	Marion.

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Name.	*Postoffice.*	*County.*
Lasenby, Prof. W. R	Columbus, Ohio.	
Library Ohio State University	Columbus, Ohio.	
Library of Pomology	Washington, D. C.	
Morrill, R	Benton Harbor, Mich.	
Ohmer, N	Dayton, Ohio.	
Sanders, Edgar	Chicago, Ill.	
Stanton, J. W	Richview, Ill.	
Taft, Prof. L. R	Agricultural College, Mich.	
Vandeman, H. E	Parksley, Va.	
Willard, S. D	Geneva, N. Y.	

ANNUAL MEMBERS.

Name.	*Postoffice.*	*County.*
Albertson, Emory	Bridgeport	Marion.
Albertson, Mrs. E	Bridgeport	Marion.
Anderson, O. C	Mentone	Kosciusko.
Anderson, E. D	Mentone	Kosciusko.
Andrews, Wm	Wolcottville	Lagrange.
Andrews, Mrs. Wm	Wolcottville	Lagrange.
Apple, J. W	Oaklandon	Marion.
Apple, Mrs. J. W	Oaklandon	Marion.
Baldwin, T. A	Oxford	Benton.
Baldwin, Mrs. T. A	Oxford	Benton.
Barr, R. J	Washington	Daviess.
Barr, Mrs. R. J	Washington	Daviess.
Beard, Jonathan	Edwardsville	Floyd.
Beard, Mrs. Jonathan	Edwardsville	Floyd.
Berryman, W. L	Tipton	Tipton.
Berryman, Mrs. W. L	Tipton	Tipton.
Beuoy, Ran	Matthews	Grant.
Beuoy, Mrs. Ran	Matthews	Grant.
Billingsley, J. J. W	Indianapolis	Marion.
Billingsley, Mrs. J. J. W	Indianapolis	Marion.
Biliter, Ben. F	Huntington	Huntington.
Biliter, Mrs. Ben. F	Huntington	Huntington.
Bird, John	Raysville	Henry.
Bird, Mrs. John	Raysville	Henry.
Bowman, Jonas	Wolf Lake	Noble.
Bowman, Mrs. Jonas	Wolf Lake	Noble.
Bradley, C. P	South Bend	St. Joseph.
Buker, F. M	Rome City	Noble.
Buker, Mrs. F. M	Rome City	Noble.
Bullock, L. O	Lagrange (R. R. No. 1)	Lagrange.
Bullock, Mrs. L. O	Lagrange (R. R. No. 1)	Lagrange.
Bundi, Joe, Jr	Newhaven	Allen.
Burket, Elmore	Markle	Huntington.
Burris, J. B	Cloverdale	Putnam.
Burris, Mrs. J. B	Cloverdale	Putnam.

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Name.	*Postoffice.*	*County.*
Campbell, Geo. P	Bloomington	Monroe.
Campbell, Mrs. Geo. P	Bloomington	Monroe.
Carey, W. W	Albion	Noble.
Case, Riley C	Lagrange (R. R. No. 1)	Lagrange.
Case, Mrs. R. C	Lagrange (R. R. No. 1)	Lagrange.
Chamberlain, R. H	Bloomington	Monroe.
Chamberlain, Mrs. R. H	Bloomington	Monroe.
Chapman, Melvin	Pendleton	Madison.
Cobbs, J. R	Rome City	Noble.
Cobbs, Mrs. J. R.	Rome City	Noble.
Coburn, John	Indianapolis	Marion.
Coburn, Mrs. John	Indianapolis	Marion.
Coffeen, T. J	South Bend	St. Joseph.
Cole, B. F	Trafalgar	Johnson.
Cole, Mrs. B. F	Trafalgar	Johnson.
Cotton, I. N	Indianapolis	Marion.
Cox, Jesse	Westfield	Hamilton.
Crawford, Matthew	Cuyahoga Falls, Ohio.	
Custer, L. B	Logansport	Cass.
Custer, Mrs. L. B	Logansport	Cass.
Daubenspeck, J. W	Mattsville	Hamilton.
Davis, Mrs. B. A	Laporte (R. R. No. 1)	Laporte.
Davis, E. B	Cartersburg	Hendricks.
Davis, Mrs. E. B.	Cartersburg	Hendricks.
Deal, L. E.	Lagrange	Lagrange.
Deal, Mrs. L. E	Lagrange	Lagrange.
Demaree, J. Y	Bud	Johnson.
Demaree, Mrs. J. Y	Bud	Johnson.
Dickenson, Frank E	Wolcottville	Lagrange.
Dickenson, Mrs. Frank E.	Wolcottville	Lagrange.
Dinsmore, Joe	Bloomington	Monroe.
Dorner, Fred, Sr.	Lafayette	Tippecanoe.
Dorner, Mrs. Fred, Sr	Lafayette	Tippecanoe.
Dorner, Fred, Jr	Lafayette	Tippecanoe.
Dorner, Mrs. Fred, Jr	Lafayette	Tippecanoe.
Eickhoff, Ed. A	Gallaudet	Marion.
Eickhoff, Mrs. Ed. A.	Gallaudet	Marion.
Eshelman, A. L	Woodruff	Lagrange.
Eshelman, Mrs. A. L	Woodruff	Lagrange.
Eshelman, Henry	Wolcottville	Lagrange.
Eshelman, Levi	Wolcottville	Lagrange.
Eshelman, Mrs. Levi	Wolcottville	Lagrange.
Ellison, R	Lagrange	Lagrange.
Ellison, Mrs. R	Lagrange	Lagrange.
Elliott, Jesse P	Alquina	Fayette.
Fess, Fred	Bloomington	Monroe.
Fess, Mrs. Fred	Bloomington	Monroe.
Febles, George	Albion	Noble.

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Name.	*Postoffice.*	*County.*
Febles, Mrs. George	Albion	Noble.
Flanner, Frank W	Indianapolis	Marion.
Flanner, Mrs. Frank W	Indianapolis	Marion.
Flick, W. B	Lawrence	Marion.
Flick, Mrs. W. B	Lawrence	Marion.
Fowler, Jas. A	Pendleton	Madison.
Fowler, Mrs. Jas. A	Pendleton	Madison.
Frame, J. R	South Bend	St. Joseph.
Frame, Mrs. J. R	South Bend	St. Joseph.
Fry, W. H	Franklin	Johnson.
Fry, Mrs. W. H	Franklin	Johnson.
Furnas, T. C	Sheridan	Hamilton.
Furnas, Mrs. T. C	Sheridan	Hamilton.
Garretson, Davis	Pendleton	Madison.
Garretson, Harvey	Pendleton	Madison.
Garretson, Amos	Pendleton	Madison.
Garretson, Mrs. Amos	Pendleton	Madison.
Garretson, C. A	Pendleton	Madison.
German Kali Works	New York City.	
Gillette, J. J	Lagrange	Lagrange.
Gillette, Mrs. J. J	Lagrange	Lagrange.
Good, M. J	Avilla	Noble.
Good, Mrs. M. J	Avilla	Noble.
Graham, A. A	Liberty	Union.
Grossman, Miss Mary	Wolcottville	Lagrange.
Grossman, J. C	Wolcottville	Lagrange.
Gustin, E. R	Peru	Miami.
Hadley, Mrs. Addison	Hadley	Hendricks.
Hale, H. J	Indianapolis	Marion.
Hale, Mrs. H. J	Indianapolis	Marion.
Haines, Noah	Pendleton	Madison.
Haines, Mrs. Noah	Pendleton	Madison.
Hardy, Thos. M	Pendleton	Madison.
Hardy, Mrs. Thos. M	Pendleton	Madison.
Henby, J. K	Greenfield	Hancock.
Henby, Mrs. J. K	Greenfield	Hancock.
Henderson, R. D	Pleasantville	Sullivan.
Henney, A. N	Wolcottville	Lagrange.
Henney, Mrs. A. N	Wolcottville	Lagrange.
Henry, H. W	Laporte	Laporte.
Hess, Ed	Brook	Newton.
Hobbs, E. M. C	Salem	Washington.
Hobbs, Mrs. E. M. C	Salem	Washington.
Hoover, John	Spiceland	Henry.
Hoover, Mrs. John	Spiceland	Henry.
Howland, C. A	Howland	Marion.
Howland, E. J	Howland	Marion.
Howland, Mrs. E. J	Howland	Marion.

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Name.	*Postoffice.*	*County.*
Jackson, W. C	Lagrange	Lagrange.
Jackson, Mrs. W. C	Lagrange	Lagrange.
Jester, L. N	Colburn	Tippecanoe.
Jester, Mrs. L. N	Colburn	Tippecanoe.
Johnson, Sylvester	Irvington	Marion.
Johnson, Mrs. Sylvester	Irvington	Marion.
Johnson, D. B	Mooresville	Morgan.
Johnson, Mrs. D. B	Mooresville	Morgan.
Kegerreis, J. C	Redkey	Jay.
Kegerreis, Mrs. J. C	Redkey	Jay.
Kell, George V	Huntertown	Allen.
Kimmell, J. C	Ligonier	Noble.
Kimmell, Mrs. J. C	Ligonier	Noble.
Kingsbury, J. G	Irvington	Marion.
Kingsbury, Mrs. J. G	Irvington	Marion.
Kirby, Ben	Bloomington	Monroe.
Kirby, Mrs. Ben	Bloomington	Monroe.
Knaub, Ben	North Vernon	Jennings.
Knaub, Mrs. Ben	North Vernon	Jennings.
King, Chris	Rushville (R. R. No. 6)	Rush.
Lafuse, L. H	Liberty	Union.
Lafuse, Mrs. L. H	Liberty	Union.
Lampton, O. A	Lagrange	Lagrange.
Lampton, Mrs. O. A	Lagrange	Lagrange.
Latta, Prof. W. C	Lafayette	Tippecanoe.
Latta, Mrs. W. C	Lafayette	Tippecanoe.
Leaming, Henry	Romney	Tippecanoe.
Leaming, Mrs. Henry	Romney	Tippecanoe.
Leaming, G. C.	Romney	Tippecanoe.
Leaming, Mrs. G. C	Romney	Tippecanoe.
Little, James	Cartersburg	Hendricks.
Little, Mrs. James	Cartersburg	Hendricks.
Lord, J. Erwin	Pompanoosuc, Vt.	
Louth, C	Battle Ground	Tippecanoe.
Lowth, Charles	Lagrange (R. R. No. 1)	Lagrange.
Lowth, Mrs. Charles	Lagrange (R. R. No. 1)	Lagrange.
Maish, D. F	Frankfort	Clinton.
Maish, Mrs. D. F	Frankfort	Clinton.
Martin, John P	Logansport	Cass.
McClue, Charles	Angola	Steuben.
McClue, Mrs. Charles	Angola	Steuben.
McDougal, D. T	Bronx Park, N. Y.	
McMahan, H. F	Liberty	Union.
McMahan, Mrs. H. F	Liberty	Union.
McIntosh, G. W	Rego	Orange.
McIntosh, Mrs. G. W	Rego	Orange.
McMillan, Jas. H	Logansport	Cass.
McMillan, Mrs. Jas. H	Logansport	Cass.

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Name.	*Postoffice.*	*County.*
Milhous, J. J	Valley Mills	Marion.
Milhous, Mrs. J. J	Valley Mills	Marion.
Mills, J. W	Lagrange (R. R. No. 1)	Lagrange.
Mills, Mrs. J. W	Lagrange (R. R. No. 1)	Lagrange.
Morris, Lon	Emporia	Lagrange.
Morris, Mrs. Lon	Emporia	Lagrange.
Moore, Dr. Henry	Irvington	Marion.
Moorehouse, Jno. W	Albion	Noble.
Moorehouse, Mrs. Jno. W	Albion	Noble.
Moyer, G. N	Laketon	Wabash.
Moyer, Mrs. G. N	Laketon	Wabash.
Mustard, Wm	Broad Ripple	Marion.
Mustard, Mrs. Wm	Broad Ripple	Marion.
Neal, Mrs. Isabel	Albion	Noble.
Newby, Thos. T	Carthage	Rush.
Newby, Mrs. Thos. T	Carthage	Rush.
Newman, R. H	Lagrange (R. R. No. 3)	Lagrange.
Newman, Mrs. R. H	Lagrange (R. R. No. 3)	Lagrange.
Newton, George F	South Bend	St. Joseph.
Newton, Mrs. George F	South Bend	St. Joseph.
Parker, Frank	Wolcottville	Lagrange.
Perry, Alex	McCutcheonville	Vanderburgh.
Peterson, Henry C	Albion	Noble.
Peterson, Mrs. Henry C	Albion	Noble.
Phelps, W. W	Noblesville	Hamilton.
Public Free Library	St. Louis, Mo.	
Ragan, J. W	Filmore	Putnam.
Ragan, Mrs. J. W	Filmore	Putnam.
Ratliff, Walter S	Richmond	Wayne.
Ratliff, Mrs. Walter S	Richmond	Wayne.
Reed, W. C	Vincennes	Knox.
Ritterskamp, W. J	Princeton	Gibson.
Ritterskamp, Mrs. W. J	Princeton	Gibson.
Robinson, Norman	Southern Pines, N. C.	
Robison, E. A	Rocklane	Johnson.
Rockhill, D. K	South Bend	St. Joseph.
Rockhill, Mrs. D. K	South Bend	St. Joseph.
Rouk, Daniel W	New Ross	Montgomery.
Royer, E. E	Wolcottville	Lagrange.
Royer, Mrs. E. E	Wolcottville	Lagrange.
Royer, Charles S	Valentine	Lagrange.
Royer, Mrs. Charles S	Valentine	Lagrange.
Ruhl, Benjamin	Lima	Lagrange.
Ruhl, Mrs. Benjamin	Lima	Lagrange.
Sams, Sylvester	Albion	Noble.
Sams, Mrs. Sylvester	Albion	Noble.
Sanders, Riley	Bloomington	Monroe.

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Name.	*Postoffice.*	*County.*
Schermerhorn, J. M.	Brimfield	Noble.
Scholl, Jonas	Lyons Station	Fayette.
Seagley, A. J	Wolcottville	Lagrange.
Seagley, Mrs. A. J	Wolcottville	Lagrange.
Shaw, A. M	Whitestown	Boone.
Shoemaker, A. W	Daleville	Madison.
Shoemaker, Mrs. A. W	Daleville	Madison.
Silver, G. W	Pendleton	Madison.
Silver, Mrs. G. W	Pendleton	Madison.
Simpson, H. D	Vincennes	Knox.
Smith, Isaac A	Warren	Huntington.
Smith, Mrs. Isaac A	Warren	Huntington.
Snyder, E. E	Wolcottville	Lagrange.
Snyder, Mrs. E. E	Wolcottville	Lagrange.
State Librarian	Indianapolis	Marion.
State Librarian	Concord, Mass.	
Stevens, W. W.	Salem	Washington.
Stevens, Mrs. W. W	Salem	Washington.
Stineman, Jonas	Wawpecong	Miami.
Stineman, Mrs. Jonas	Wawpecong	Miami.
Stinger, B. F	Charlottesville	Hancock.
Stinger, Mrs. B. F	Charlottesville	Hancock.
Stockberger, J. J.	Ligonier	Noble.
Stout, H. M	Trafalgar.	Johnson.
Stout, Mrs. H. M	Trafalgar.	Johnson.
Stout, Wilbur C	Monrovia	Morgan.
Stout, Mrs. Wilbur C.	Monrovia	Morgan.
Stuart, William	Lafayette	Tippecanoe.
Stuart, Mrs. William	Lafayette	Tippecanoe.
Studebaker, F. L	Warren	Huntington.
Studebaker, Mrs. F. L	Warren	Huntington.
Swaim, H. H	South Bend	St. Joseph.
Swaim, Mrs. H. H	South Bend	St. Joseph.
Swain, Walter A	Pendleton	Madison.
Swain, Mrs. Walter A	Pendleton	Madison.
Swain, C. E	Pendleton	Madison.
Swain, Mrs. C. E.	Pendleton	Madison.
Swain, William	Pendleton	Madison.
Swift, Evan	Franklin	Johnson.
Talbert, Rev. William	Albion	Noble.
Talbert, Mrs. William	Albion	Noble.
Thomas, J. L	Pendleton	Madison.
Thomas, Mrs. J. L.	Pendleton	Madison.
Thomas, Snead	Marion	Grant.
Thorpe, E. R.	Washington	Daviess.
Tilson, John	Franklin	Johnson.
Tilson, Mrs. John	Franklin	Johnson.
Troop, Prof. James	Lafayette	Tippecanoe.
Troop, Mrs. James	Lafayette	Tippecanoe.

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Name.	*Postoffice.*	*County.*
Tufts, Elmer G	Aurora	Dearborn.
Tufts, Mrs. Elmer G	Aurora	Dearborn.
Walker, Ernest	Fayetteville, Ark.	
Walker, Mrs. Ernest	Fayetteville, Ark.	
White, John T	Connersville	Fayette.
White, Mrs. John T	Connersville	Fayette.
Williams, S. T. S.	Knightstown	Henry.
Williams, Mrs. S. T. S	Knightstown	Henry.
Williams, W. A	Rome City	Noble.
Williams, Mrs. W. A	Rome City	Noble.
Wimple, E. C	Valentine	Lagrange.
Wimple, Mrs. E. C	Valentine	Lagrange.
Woodworth, J	South Bend	St. Joseph.
Wood, A. C	Pendleton	Madison.
Wood, Mrs. A. C	Pendleton	Madison.
Young, W. A	Franklin	Johnson.
Young, Mrs. W. A	Franklin	Johnson.

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NOTE BY THE SECRETARY.

The manuscript for this Annual, and which was collected by Prof. James Troop, the former Secretary, was lost, in its transmission to me, by the express company. An earnest effort has been made to obtain copies and reproductions. This has been measurably successful, but in some instances papers could not be secured, and the stenographer's report of the Orleans meeting could not be procured. This will account for the absence of papers and the report of the discussions at that meeting.

W. B. FLICK,
Secretary.

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PROCEEDINGS

OF THE

Indiana Horticultural Society.

MIDSUMMER MEETING AT ORLEANS, AUGUST 20 AND 21,

1901.

The first midsummer meeting, under the auspices of the Indiana Horticultural Society and Purdue University School of Agriculture, was held at Orleans, Indiana, on Tuesday and Wednesday, August 20 and 21, 1901.

Following is the program for the meeting:

TUESDAY, AUGUST 20.

Symposium—Fruit Possibilities in Southern Indiana.

Geo. P. Campbell.....Bloomington
J. A. Burton.....Orleans
Mrs. W. W. Stevens.....Salem

Conditions of Success in Fruit Growing.

The Man—S. H. Fulton.....South Haven, Mich.
The Soil—C. M. Hobbs.....Bridgeport

Evening—Educational Session.

The Farmer's Son—H. F. McMahan.....Fairfield
The Farmer's Daughter—Mrs. C. N. Lindley.....Salem

WEDNESDAY, AUGUST 21.

Tree Fruits—Market Varieties.

Apples and Pears—C. M. Hobbs.....Bridgeport
Stone Fruits—U. M. Stewart.....Madison
Soil Fertilization—Prof. H. A. Huston.....Lafayette
Spraying and Spraying Mixtures—S. H. Fulton.....Michigan

The Apple and How to Grow It.

Soil and Site—J. A. Burton.....Orleans
Planning and Care of the Young Orchard—Will. Ritterskamp...Princeton
Care of the Bearing Orchard—W. C. Reed.....Vincennes
Pruning and Thinning—Prof. E. S. Goff.....Madison, Wis.

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MORNING SESSION.

Tuesday, August 20, 9 A. M.

FRUIT POSSIBILITIES IN SOUTHERN INDIANA.

BY GEORGE P. CAMPBELL, BLOOMINGTON.

At the present it is very gloomy for the farmer, gardener and fruit grower. No doubt there are many who feel like giving up in despair, but we must not give up, but push ahead and try and find the means to overcome at least some of the difficulties that confront us. I can remember when it was no trouble to grow all kinds of fruit with but very little attention. Farmers would set the trees in the fence corner, and without any cultivation or attention would in a very few years receive bountiful crops of fruit; and still all must acknowledge that fruit growing in southern Indiana is in its infancy. We are just beginning to find out that the soil in this section of the State is as well or better adapted to fruit growing, especially the apple and pear, than any other State in the Union. Our limestone clay soil puts more color and flavor in the fruit than can be found anywhere else. Some years the climatic conditions are such that we have failures in some kinds of fruits, but it is seldom that we fail in all on that account.

What, then, is the main hindrance to our growing fruit successfully? My answer is, Injurious insects and fungous diseases. We have insects that prey upon us on every hand; they eat our clothing, our furniture, and prey on our domestic animals, but it is to the farmer and fruit grower that they are of especial interest. It is a continual warfare to keep the injurious insects from destroying our entire crop. Our entomologists are giving a great deal of time and thought to these pests and are finding weapons by which we may in some degree defend ourselves against their depredations. We, as farmers and horticulturists, are not showing our appreciation of their efforts to help us; they are human and often make mistakes, but we should encourage them to go ahead for the successes they have made. Practical entomology should be taught in our common schools; there are but few children but would take an interest in it if properly presented. Some of our legislators and cranks seem to think that we must now have Latin, French and Greek taught in our common schools. These dead languages may be all right for ministers and professors in our colleges, but of what practical benefit is it to the farmer's

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son and daughter? Give us entomology and botany in the common schools and the boys and girls will be more interested in agricultural and horticultural pursuits and will better know how to defend themselves against all insect intruders.

We have already found that judicious spraying with a solution of paris green or other arsenites is very beneficial for the destruction of insects that devour our fruit and foliage; also, that there are other remedies for the destruction of fungous diseases, but it has not been an entire success. The sooner the young people are taught these branches in the common schools the sooner we will be able to overcome these obstacles.

The State Horticultural Society has recognized the fact that we in southern Indiana are better located as regards soil and climate than any other part of the State by locating the experimental orchard in our midst. This orchard, if managed properly, will be the means of advancing the fruit interest in this part of southern Indiana and the entire State.

Looking back a few years, and thinking of what great things have been accomplished in the way of mechanical devices for the benefit of the farmer and fruit grower, it is but natural for us to look forward and try and imagine what will be done in the near future.

This is an age of invention and electricity, and I think it possible to invent an electrical machine that will do away with paris green and Bordeaux mixture. All that we need do will be to point the instrument at the tree or plant, press a button, and all insect life will be no more.

The hills of these southern counties now grown up with jack oak and sassafras will in a few years be covered with luxuriant vineyards and apple and pear orchards. There will be a horticultural society in every school district which will be subordinate to the Southern Indiana Horticultural Society, which will hold quarterly meetings at the experimental orchard near Orleans. Then we may be growing Ben Davis apples as big as peck measures and Concord and Niagara grapes as large as goose eggs. The products can be loaded into air ships which will carry them to market. They will leave this part of the State at 3 a. m. and arrive in Chicago in time for the morning market, where the contents can be sold and the owner return home in time for dinner.

FRUIT POSSIBILITIES IN SOUTHERN INDIANA.

BY JOE A. BURTON, ORLEANS.

The Apple.—Since 1896 southern Indiana has not grown one-fourth the apples she has used. During the same time she has not used one-fourth what she needed. That is, during the last six years southern Indiana has produced less than one-sixteenth of the apples needed for home

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consumption. A herculean task is assigned me to convince these people they ought to go into apple growing for profit in the face of these facts. One missionary, having labored seven years in a heathen land without a convert, was asked to desist; that nothing could be accomplished. He replied that he would not desist, for the Eternal God had promised success. Well, the Eternal God has abundantly combined the necessary conditions for successful apple growing here. The only requisite left out is the suitable man. When I try to induce my neighbors to grow apples, they say "Oh, yes, we know you can grow them, but we can't." Some say I ought to grow them for the whole community.

Now, I think I know my own worth and abilities better than anybody else, and I know it has not been by the free use of ability that I have succeeded in apple growing. I have applied very little of what knowledge I had in producing my good crops. Like many of my neighbors, I know better than I do. Did I use as much care in attending my orchard as some of my neighbors do in their grain crops, my success would be phenomenal. I hope to do better in the future, but whether this will induce others to engage in the business, or deter them, is uncertain. If they attribute my success alone to my efforts, and not to the natural advantages of the country, they will be driven further away. I have grown fine apples, largely because it is easy to grow fine apples. I had the finest Winesaps at Paris, probably because there were no other Winesaps there from southern Indiana. I have taken first premium on Winesaps for years till this year, when another man from southern Indiana brought up some and beat me, and says he will do it again. Yes, and he may beat me on Grimes. Now, I beg pardon for talking so much about myself, but I want you to understand that it is the great adaptability of southern Indiana that is responsible for my fine apples, rather than Joe A. himself. I would not intimate that paying crops can be grown here without some care. That day has passed. What I want to impress upon you is that it is not a difficult thing to grow apples in this region.

FRUIT POSSIBILITIES IN SOUTHERN INDIANA.

BY MRS. W. W. STEVENS, SALEM.

Much of the entire area of southern Indiana is specially adapted to the growing of fruits, both small and tree. The knob lands all along the Ohio river have sufficient elevation and adaptability of soil to make both apple and peach growing profitable. Here we now find the largest peach and apple orchards in the State. The small fruit industry is being developed in a few localities, and is proving quite remunerative. We know farmers who have realized as much as $450 per acre on strawberries.

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Where up-to-date methods of cultivation and caring for orchards are practiced, fruit land will yield much larger returns than any other branch of farming. We would not encourage peach growing, except in a very few especially favorable localities, but the possibilities of apple culture on our limestone soils, and of small fruits on the free stone, are without limit, both in quality and quantity of fruit. All we need to make this part of the State famous is well directed energy and co-operation among intelligent, progressive fruit growers. We do not think our State Horticultural Society has ever done as grand a work for horticulture as that of locating an experimental apple orchard here in a section of country that is especially adapted to apple growing.

The possibilities of apple growing in at least a dozen counties that lie along the Ohio river is best exemplified by stating what has been done in a few localities. We know of lands that a dozen years ago were considered worth little more than the taxes that were paid thereon—were sold at from one to three dollars per acre. When it was discovered that this same land, when planted to apples, and when large enough to produce a crop, brought in one season from $75 to $100 per acre, these same lands brought more than the level bottom lands that were especially adapted to corn and wheat growing. We also knew lands on the knobs that twenty-five years ago had been deserted and given up as worthless, but now that the cultivation of small fruits has developed, these same lands are veritable garden spots and the new, commodious homes of the owners thereof bear testimony that prosperity has again returned to them. But haphazard methods will not win success in southern Indiana any more than in other sections of the country. But the man who starts an orchard and is capable of giving it the right kind of treatment is surer of success than a farmer in any other line. We must cultivate, we must spray, we must thin our fruit if we would get a profit out of it. Every year it becomes more apparent that the supply of good fruit is far below the demand, and the successful grower is realizing larger profits than ever before. We are sure that the possibilities of fruit growing is growing brighter and brighter as the days go by.

CONDITIONS OF SUCCESS IN FRUIT GROWING.

THE MAN.

BY S. H. FULTON, SOUTH HAVEN, MICH.

No copy of this paper was obtained.

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CONDITIONS OF SUCCESS IN FRUIT GROWING.

THE SOIL.

BY C. M. HOBBS, BRIDGEPORT.

All soils have their origin in the disintegration of the rocks and in the decay of vegetable and animal matter. The gravel, sand and clay come from the rocks; the humus from the vegetable and animal matter. The different combinations of these substances give us our variety of soils. When gravel predominates, we have a gravelly soil; when sand, we have a sandy soil; when finely pulverized or ground stone, we have the clay soil; when vegetable and animal matter predominates, we have the humus, or light porous black or brown soil.

All the higher or more useful forms of plant life are dependent upon the soil for an existence, and in turn all animal life is dependent upon plant life. Thus we are shown the importance of the soil to all life. Organic life springs from the water and soil, and largely to it returns. It is written of man, the higher animal, "Dust thou art, and to dust shalt thou return."

The composition of the soil largely determines the kind of plant life growing upon it. In addition to the plant food held in the soil the character of the vegetation is greatly affected by warmth and moisture; warmth and moisture are largely determined by the composition of the soil.

If we have a soil composed of gravel, sand, or both combined, we are apt to have a hot, dry soil in summer, supporting but little if any vegetation; if a heavy clay, it is generally cold and wet, or if dry, very hard and compact; if we have an excess of vegetable and animal matter, humus, we shall have a very porous, light soil, becoming hot and dry in dry weather, and in wet weather producing an excessive growth of vegetation on account of the presence of a great amount of nitrogen in such soils.

The composition of soils so much affects the growth of trees that we have come to know the character of the soil from the kinds of trees and plants growing upon them. Hence we speak of sugar tree, poplar, black walnut, beech and black jack soils.

As to fruits, experience has proven to us that soil and situation will to a considerable extent determine the varieties to be planted; for instance, we have learned that peaches and grapes do best on a light, warm, sandy or gravelly soil, while pears and quinces do best on a heavy clay.

For all practical purposes, the kinds of soil most common to our State may be described and located as follows:

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The black alluvial soils, containing a large per cent. of humus, or vegetable matter, and varying quantities of sand and clay, and of varying depth, underlain with gravel or heavy clay, and to be found for the most part in the level and lower situations in the central, northern and western portions of the State. This character of soil is best adapted to growing the cereals, grasses and vegetables.

When the black, loose, surface soil is of moderate depth and underlain with a stiff clay, if such a soil be well tile drained, the tree fruits will succeed fairly well, especially apples, pears and plums. Some varieties of small fruits succeed very well on this kind of soil, but this character of soil is not congenial to a very great variety of small fruits.

When this black surface soil is of considerable depth, plants and trees do not seem to produce as good a root system as in the clay soils; it seems to lack the necessary mechanical conditions, as well as the conditions essential to the best plant and tree development.

The sandy, gravelly soils are, for the most part, found in the extreme northern portions of the State and along the water courses. The more clay and humus mixed with the sand and gravel, the better the soil for grain and fruits. If the soil be mostly sand, several inches in depth, underlain with gravel, unless the water level below comes within reach of the plants, in dry weather the soil becomes dry and hot and unfavorable for plant or tree growth. Such a soil is especially unfavorable for small fruit plants; these root near the surface and burn out in dry weather for want of moisture.

The sandy clay soils, or what are popularly known as sugar-tree soils, are pretty well distributed over the higher and more rolling sections of the State. This is our best general purpose soil. It usually has good surface and underdrainage, a sufficiently retentive clay sub-soil, with a surface soil of right proportion of clay, sand and humus to give the best mechanical and fertile conditions. Such a soil cultivates easily, holds moisture and fertilizers well, and under favorable conditions will grow well any crop of grain, grasses, or fruits we can grow in this latitude.

Then we have the level or low, heavy, wet, clay soils of the central portion of the State, popularly known as beech-tree soil. This soil usually contains but little humus, or vegetable matter, is a very heavy, compact clay, holding water almost like a jug, and wholly unfit for any kind of cultivated crops without thorough tile drainage and the addition of vegetable matter in the form of stable manure or green crops turned under. This land was regarded by the early settlers as unsuitable for farming.

With these improvements in the mechanical conditions of the heavy clay soil, and an occasional application of fertilizers, we can grow all our

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leading crops. Such soils are especially adapted to growing pears and quinces, as they do best on a heavy, moist, rich, clay soil. Apples, plums and cherries will succeed well, and small fruits, especially strawberries, will do well on this kind of land.

Closely akin to these heavy clay soils of the central portion of the State, are the white clay soils of the hilly sections of the southeastern part of the State, along the Ohio river. These, with the red clay soils of the hilly sections of the southern part of the State, make up our best fruit soils. They are especially adapted to the apple, peach, plum, blackberry and raspberry. I question whether finer apples are grown anywhere than can be grown on the red clay soils of the low hills bordering Orange and Lawrence counties. I have never seen finer blackberries and raspberries than are grown in these red clay soils.

Thus far we have had to do principally with the mechanical make-up of the soil. The fertility of the soil is as important as its mechanical condition. A proper condition of fertility is that condition where all the elements that enter into the plant's growth are readily available in sufficient quantity to meet every demand in the highest development of plant and fruit.

Through many years of cropping, most of our lands have become more or less impoverished. This is especially true of the clay lands, our best fruit lands. In the hilly sections they have become impoverished by washing and leaching, as well as by constant cultivation. An improper system of cultivation has not only reduced the fertility of our clay soils, but it has made the mechanical conditions less favorable by the removal of vegetable matter, and in this way they have become compacted or run together to such an extent as to have become lifeless and unfavorable to healthy plant growth. We should have a proper mechanical condition of soil, good drainage, and sufficient humus to make the soil loose and friable.

We will find that most of our fruit lands will be benefited by an application of the three principal mineral elements in plant growth, potash, phosphoric acid and nitrogen. Stable manure, with the addition of unleached wood ashes, makes a good fruit fertilizer for clay lands. This form of manure contains, readily available, all the necessary plant food, besides a quantity of vegetable matter that tends to better the mechanical condition by rendering the soil more porous.

Stable manures are open to two objections as a fruit fertilizer, first, the composition or strength is an unknown quantity, and we can not tell just how much of each of the important elements we are applying. The second objection is that stable manures usually contain too great a per cent. of nitrogen, and if applied heavily stimulate too rank a growth of

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plant at the expense of the fruit; and in the case of trees and shrubs, induce a late, sappy wood growth that is liable to damage from severe winters.

Probably the most economic and satisfactory fruit fertilizer is commercial potash and phosphoric acid and nitrogen, the latter when practicable through clover or leguminous plants. If the soil contains the proper proportions of plant food, the plants and trees will not only make a thrifty, vigorous growth, but the fruit will be more abundant, larger, firmer, more highly colored, and better in quality.

Chemical analysis shows that trees and fruits, especially the latter, vary in their composition; for instance, apples and peaches contain two and one-half times more potash than pears. This suggests that, in applying fertilizers, we should be governed somewhat by the proportion each class of fruits use.

One hundred bushels of apples analyze about 1 pound of phosphoric acid, 10 pounds of potash, 7 pounds of nitrogen. One hundred bushels of pears, 1½ pounds phosphoric acid, 4 pounds potash, 5 pounds nitrogen. One hundred bushels of peaches, 2½ pounds phosphoric acid, 13 pounds of potash, 6 pounds of nitrogen.

Probably for apples we should use of nitrogen 4 per cent., potash 6 per cent., phosphoric acid 2 per cent. For pears, nitrogen 4 per cent., potash 2 per cent., phosphoric acid 4 per cent. For peaches, nitrogen 4 per cent., potash 5 per cent., phosphoric acid 4 per cent.

For small fruits, generally speaking, the proportion for peaches is the best suited. If stable manures are used, the ground should be thinly covered early in the spring and worked into the soil. If commercial fertilizers are used, they should be applied in early spring to the general surface, at the rate of from 400 to 600 pounds to the acre annually. Annual fertilization by some method is essential to the highest success in fruit growing.

EVENING SESSION.

Tuesday, August 20, 7:30 P. M.

HOW MUCH AND WHERE SHALL WE EDUCATE OUR BOYS?

BY H. F. M'MAHAN, LIBERTY.

In a good many things we are agreed as to how much and where shall our boys be educated. Not one of us but would have every faculty of mind developed to the limit, every organ of the body perfectly developed. We would have our boys grow to be strong men—strong physic-

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ally, strong morally, strong mentally. I think we are agreed that that education should begin very early in life. Long before they reach the school age we begin their moral and physical training, making sure they grow straight and strong, that, in so far as we can train them, their senses make quick and clear discriminations, and that honesty, industry, truthfulness and reverence for the right become habitual.

We are agreed, too, that every opportunity the common school affords shall be theirs. Even the most careless parents recognize the absolute need of this part of a boy's education. A knowledge of arithmetic, reading, spelling and writing are essential to success in any business, while language studies, history and geography are very necessary if our boys are to be capable, intelligent citizens. And just so many as have it in their power will send their boys through high school, believing the mental effort necessary to master higher mathematics, Latin, rhetoric and the natural sciences will better fit them to solve the real problems of life when they begin business on their own account.

If our boys would be merchants, lawyers, physicians, teachers, engineers, or wish to enter any of the so-called learned professions, we are willing to make all sorts of sacrifices, if need be, to give them special training in their chosen line of work. The genius may succeed without this special training. We know well enough that few of our boys are geniuses, and that if they are to have an even chance with the born genius, they must have every advantage the special school affords. Fifty years ago serving an apprenticeship was thought sufficient, thus gaining the experience of one, or at most a few, men. Today we would have our boys familiar with the learning of as many great minds as can be crowded into a college course.

It is not hard to find illustrations among successful men to prove the need of such training. Within the last few years a score of men I know, many of them from my own county, have risen to distinction who were college-trained. The college was not entirely responsible for their success, but the training it gave materially aided them in winning success.

I say we are agreed as to the common school, the high school, and special schools or college training for those boys who expect to become professional men. Now, what about the thousands of boys that are to succeed or fail on the farm? We'll agree, I suppose, they shall receive all the training the common school can give. A good many of us will not agree that three or four years in a high school will help a boy to farm. I fear we do not keep in mind that a school of any kind is to develop and discipline a boy's mind as well as to store his mind with facts. Now, do boys who expect to farm need well-trained minds, and would a great store of facts add to their chances of success, or is it enough to know "gee and

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haw and hoe potatoes?" We know they need well-trained minds and the largest possible store of facts.

Agriculture, until a few years ago, was always looked upon as a vocation—a business at which men worked with their hands only, while in truth it is a most difficult science. It has very much to do with life, both plant and animal, the most complex of all sciences, and probably the least understood. There are many questions relating to agriculture that directly affect the farmer's success that have not been definitely answered, nor will they be answered until many men who have had the training the best schools can give attempt their solution. When we know more of soil chemistry we shall be able to use fertilizers more economically. Our tile draining will be more effective when we know more of geology. Fruit growing will be vastly more profitable when we have learned the cause and cure of all the diseases that affect it and improve by rule rather than by chance, as we do today. When we know as much of the breeding of grains as we ought to know of the breeding of live stock, grain farming may pay. When each farmer knows the best adaptation of crops to soils we shall double and treble our yield. When supply and demand are better understood, gluts and famines, with all their ruinous effects upon profits, will cease to hinder us. We have yet to learn and use the power of combination. When farmers know more of political economy they will know and demand what is best in legislation for their interests.

I have a boy whom I hope will some day be an intelligent, successful farmer. Custom says he knows enough to begin farming when he has graduated from the common school, or even before that time, practically saying his father can teach him all he needs to know in addition to the common school course. But can I? I am busy early and late and I simply can not help him to get that mental training which even a high school would give. I know but little of chemistry, of geology, of pomology, of crop relations, of adaptations of crops to soils, of live stock husbandry, and the thousand and one other things a farmer should know to succeed. If I were to attempt it he would have but one man's experience. I can not depend on his learning of my neighbors; good farmers though they be, they can not give him mental training nor teach him that store of facts that would be of so much help to him. He might learn by reading and experience—good methods, but slow, slow. I believe it is my duty, if he wants to farm—and I hope he will—to prepare myself to be the best teacher I can of the best methods and practice. No one else can so effectually arouse his interest, teach him to be so fond of his profession. I hope nature studies will be a part of both the common and high school courses, not only for the store of facts, but it is the subject of all others that teaches most rapidly independent thinking. He already knows some-

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thing of many plants and animals, and will all his life be surrounded by them. It is his right to know more of them. When he has completed the high school course, if he wishes to study law, or medicine, or theology, I'll help him get special training, that he may have an even chance with men in his profession to succeed. And I will not do the square thing by him, if he wishes to farm, if I do not give him a course in an agricultural college, or help him get it, for he will certainly need the information and mental training as much in farming as any other profession. Four years in a school where agriculture is honored, associated with earnest, intelligent instructors, who have spent their lives solving some of the many problems that must be solved before profits of farming can be large, making the acquaintance of young men and women who will be the leaders in the future of agriculture, will help to make him the most intelligent, the most prosperous, the most contented, the happiest man the sun will shine upon.

MORNING SESSION.

Wednesday, August 21, 9 A. M.

MARKET VARIETIES OF APPLES AND PEARS FOR SOUTHERN INDIANA.

BY C. M. HOBBS, BRIDGEPORT.

We have been shown how necessary it is to successful commercial fruit growing that the man, or the one who is to engage in the business, possesses the proper qualifications.

The next most important thing is the varieties of fruits to be planted. We may have the situation and soil well suited to commercial fruit growing, we may have perfect cultivation and care of the trees, but unless the varieties planted be adapted to the soil and climate, and to the market to be supplied, we can not hope for success. From this we see that the proper selection of varieties for commercial orchards is of great importance.

In driving through Mr. Burton's orchard, we saw a number of McAfee's Nonsuch and Lawyer that were practically barren of fruit. The trees of these varieties were as large, vigorous and thrifty as any trees in the orchard, yet Mr. Burton says they have never borne a profitable crop of fruit, showing their lack of adaptation to the locality where planted, and are wholly unprofitable. The success of the varieties planted is so dependent upon the soil and situation that it gives opportunity for

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great diversity of opinion as to the best varieties to plant; however, there are a few varieties of all of the different classes of fruits that seem to have quite a wide range of adaptation, succeeding on a great variety of soils and situations and under different treatment.

I presume there is no other variety of apple in cultivation at this time that has wider range of adaptation and is as generally profitable for commercial purposes as is the Ben Davis. There have been more Ben Davis trees planted in the past few years than of any other variety. Fortunately, the Ben Davis seems to have nearly every good quality except quality. It is an early and regular bearer, fruit of large size, good form and beautiful color, always attracting the eye, and as the masses buy through the eye, the Ben Davis sells well and at good prices. They often sell at five cents apiece on the fruit stands. We have learned that size and color are of first importance in marketing fruit, and on account of the characteristics mentioned, the Ben Davis for several years has been the most profitable apple grown in the central west.

For southern Indiana, a close rival to Ben Davis for profit, and in some localities superior to Ben Davis, is the Winesap, a good bearer of medium size, bright red, firm apple of good quality, and a good keeper. Southern Indiana Winesaps seem to be the finest in the world, as they took the premium over all others at the Paris Exposition.

Probably the next best apple for commercial purposes for this locality is the Rome Beauty, a fairly good bearer, fruit of large size, handsomely colored, and of good quality. I have seen some as fine specimens grown in southern Indiana as I have ever seen anywhere.

For the fourth variety of apple, a late fall and early winter variety, the Grimes Golden is without a rival as to size, color and quality. When the trees are well cared for the fruit is large enough, is smooth, and of a beautiful golden color, and the quality leaves nothing to be desired. To my own taste there is nothing superior to it in its season, or at any other season. It reaches its highest degree of perfection in southern Indiana as to size, color and quality. When I eat the Baldwin, Winesap, or most any other variety of apple, I know distinctly when the time comes to quit, but when eating the Grimes Golden there is still a doubt as to whether I should not eat another. However, the Grimes has two points of weakness —first is that the fruit matures rather early and is a little inclined to drop prematurely, and the tree seems to be rather susceptible to the fungous disease known as root rot. I think this matter of root rot could be overcome to a considerable degree by top-working on hardier roots and stems. We can not afford to give up the Grimes Golden on account of these defects, as its superior quality is being sought after, and it will sell, usually, considerably higher than Ben Davis and the more common sorts. This list

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of profitable winter varieties might be extended considerably. Possibly we might add York Imperial, Mammoth Black Twig, Jonathan, and some others.

As to summer and fall varieties, I think these should not be omitted from the commercial orchard. My observation and experience in the Indianapolis market for a number of years has been that good summer apples bring as good, or better, prices than winter apples at gathering, selling at from 75 cents to a dollar a bushel. There is usually a scarcity of first-class summer apples in this market, and we can see no reason why they can not be profitably grown, as the trees of the summer varieties bear more regularly than do the winter varieties. It seems they mature their fruit so early in the season they have vitality left for developing fruit buds for the next year's crop, hence, bear more regularly than the winter varieties which hold their crops until late in the season.

The varieties we have found to be most salable and the most profitable are Red Astrachan, Early Harvest, Yellow Transparent, Benoni, and Summer Red Stripe; and for fall apples ripening later in the season, the Maiden Blush and Wealthy have been very satisfactory. We recommend the Benoni especially for family use and market. The tree is hardy and a prolific bearer. Fruit of medium size, highly colored, yellow striped with red, with very high quality. It ripens gradually in three or four weeks' time, and will keep for a week or ten days when taken from the tree and put in the cellar. One of the faults of this variety is that of overbearing. They should be thinned somewhat in order to get the best size and quality of fruit.

The Yellow Transparent is a hardy tree, coming into bearing very early. Is a large, fine appearing, greenish yellow apple, cooks well, and is a very satisfactory market apple.

The Red Astrachan ripens before the Yellow Transparent and Benoni, and on account of its earliness, bright color, and good cooking qualities makes a very desirable early market apple.

The Summer Red Stripe is rather larger than the Benoni, a few days later in ripening, fruit is sharply conic, and is sometimes known as Sheepnose. This is a hardy tree, prolific bearer, and the fruit sells well.

For a fancy late summer apple, probably there is nothing more showy or attractive than the Chenango Strawberry; it ripens about with Summer Red Stripe, looks very much like it, but the tree is quite different in appearance, the fruit is more highly colored, and the flavor is quite different from that of the Red Stripe. On account of its attractive appearance it brings the highest price at the eating stands.

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The Maiden Blush is generally known, and needs no detailed description here. It covers three or four weeks' period in ripening, and is highly valued as a family and market fruit.

The Wealthy ripens pretty much the same time as the Maiden Blush. Tree very hardy, an early bearer, productive, fruit large striped with bright red, a good cooking apple, and a very pleasant apple to eat when fully ripened.

For a fall apple of superior quality, probably there is nothing better than the Gravenstein, and for a late fall apple we have also found the Pewaukee desirable. The tree is hardy, bears well, fruit of good size, striped with dull red, cooks well, and sells well.

As to pears for southern Indiana, the list is necessarily very much restricted, as on the light soils of southern Indiana the pear blight is much more destructive than in the heavy clay soils of the central portion of the State. I suppose there has never been much profit in pears in southern Indiana until the Kieffer came in; this variety has been very extensively planted, and has proven profitable wherever planted.* Even in the central part of the State we find varieties like Clapp's Favorite, Flemish Beauty, Bartlett and others blighting badly; in fact, we can no longer recommend Clapp's Favorite on account of its tendency to blight.

Of the older sorts of those planted on our place in the central part of the State twenty-six years ago, the Tyson and Buerre d' Anjou have proven freest from blight; in fact, the Tyson have not blighted at all. This is a remarkably hardy, fine tree, bearing a medium-sized greenish yellow pear of the highest quality, ripening the last of July. The Tyson trees are the largest and healthiest trees in our orchard. The Anjou, while it blights but little, has the fault of shedding its foliage early in the summer and not properly ripening up the fruit on this account. It is also very tardy in coming into bearing, and we do not expect a good crop of fruit off of the Anjou under fifteen years.

With us the Duchess Dwarf has been the most profitable among the dwarf pears. We have trees of this variety that were planted twenty-six years ago that are still healthy and bearing good crops of fruit. They were planted eight to ten inches below the union of the quince stock.

We have also found the Louise Bonne to be profitable as a dwarf pear.

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* The Kieffer is beginning to blight some along the Ohio river and occasionally farther north.

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STONE FRUITS AND VARIETIES.

BY U. M. STEWART, MADISON.

[Stenographer's Report].

I am going to read the names of the peaches that are grown in our section of the State: The Gainesboro, Snead, Alexander, Early Rivers, Old Mixon, Mountain Rose, Elberta, Globe, Salway, Heath and Triumph.

The Gainesboro is one that has been tried by but one person that I know of, and fruited just one year. It is a very promising sort and very early. The Snead is very profitable, ripening in July. The Alexander is well known everywhere, ripening about the same time. The old Mixon is fairly good, bears very well and is a fine looking peach. The Mountain Rose is our standard variety. The Elberta is planted by lots of people; they all want that peach for money; it carries well and sells well everywhere. It sells just like the Ben Davis apple, on its appearance, but inferior in quality. The Globe is good, but a shy bearer. The Salway is an October peach, grown in large quantity and gives good satisfaction to everybody that wants late peaches. Just like the Heath, they ripen about the same time. The Triumph is one recommended by Mr. Reed, but is not promising in our section.

The finest plums in our section are Moore's Arctic. The Damson is the second favorite of Mr. Hicks. The Lombard sells well in our section. This is a plum year. The Shipper's Pride is another very fine plum. The Lincoln is a large plum and very good quality. The Washington is a good plum, but not a sure bearer. The Raincloud is of high quality and a prolific bearer. The Robinson bears well, is good quality, but is small.

The first cherry is the Early Richmond. It isn't very profitable because it comes during strawberry season and people are not ready for cherries. There are lots shipped away. The Dyehouse doesn't bear quite as freely. The Montmorency is the one we make money on. The Black Tartarian is a profitable cherry with us, and also the Governor Wood.

SOIL FERTILIZATION.

BY S. M. HUSTON.

(See South Bend Meeting.)

SPRAYING AND SPRAYING MIXTURES.

BY S. H. FULTON, MICHIGAN.

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THE APPLE AND HOW TO GROW IT.

THE SOIL.

BY JOE A. BURTON.

Soil can scarcely be too rich for an apple orchard. Our richest soils are generally bad for apples. Our best apple lands are generally very thin. They are not good because they are poor, neither are the rich soils bad because they are rich. It is a matter of texture and location. Other things being equal, elevated land is best. By this we do not mean far above sea level, nor mountainous, but just a little above adjacent land. Of all soils, the alluvial drift is the worst. Sandy soil might be classed next. The very best of all is elevated clay formed by the decay of the native rocks. Soil is more than location. Heavy clay in the valley is better than drift loam on the hilltop. Hence, in central Indiana, the best apple lands are the heavy clay swamps. Apple trees winter-kill in the central part of our State more than in the southern on account of the nature of the soil, rather than by a greater degree of cold. Apples on heavy clay are very little affected by drought, whether cultivated or not. Hence, in a season like this, we have fine apples on our thin clay lands, while our ordinary farm crops are nearly destroyed. Because these thin clay lands have an aptness for producing apples, we must not infer they can continue to yield fine crops without being fed. My father-in-law was an expert in farm work, but in the last thirty years of his life could do nothing for lack of physical strength. So these lands can not yield their crops for lack of phosphoric acid and nitrogen. They have abundance of potash. Without fertilizers they will yield a few fine crops, then both the tree and fruit grow smaller, the limbs die, and failure is the result. Not only are the trees hardier and healthier on the heavy clay soils, but the fruit in every way is better, larger, keeps better, smoother, better color, and better quality. Why these lands have such an aptitude for apples is not known—possibly on account of the great amount of potash in the clay.

PLANNING AND CARE OF THE ORCHARD.

BY WILL RITTERSKAMP.

No copy of this paper procured.

CARE OF A BEARING ORCHARD.

BY. W. C. REED.

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PACKING AND MARKETING FRUIT.

BY E. S. GOFF, WISCONSIN.

[Abstract.]

Fruit growers, as a class, pay too little attention to the selling of their fruit. They have not learned the fact that selling fruit is as much an art as the raising of it, and that the profits of the fruit plantation may depend as much upon the skill employed in selling the fruit as upon the production of it. Professor Bailey has made the statement that there are ten men who are able to raise choice fruit to one that is able to sell the fruit to the best advantage. This may be too strong a statement, but there is much truth in it.

Last season I knew of a fruit grower that sold his crop of apples before the first of September at a price of 80 cents net per barrel. At this time the grower had a very crude idea of the amount of apples there were in the country, or whether the price at which he contracted his apples was a fair one or a ridiculously low one. He simply listened to the arguments of the buyer, and, because his statements sounded plausible, he accepted them. The buyer packed a considerable part of this crop in bushel boxes, which he sold in Chicago at from $1.50 to $2.50 each. This was equivalent to $4.50 to $7.50 per barrel. Of course, another part of the crop did not yield so much, but the poorest marketable ones brought much more than 80 cents per barrel. This poor sale was made because the fruit grower was not posted on either the apple crop or the markets.

With the excellent agricultural newspapers we now have, there is little excuse for a fruit grower remaining ignorant on these subjects. Some of our leading papers make a special effort to inform their subscribers on crop and market prospects, and a fruit grower has scarcely more excuse for being ignorant on these matters than has the merchant for being ignorant of the market value of his goods.

Another way by which fruit growers often come short of their opportunities is by putting their fruit up in an improper manner. Second-hand barrels, putting the best fruit at the top and bottom of the barrel, and mixing poor and good fruit in the same barrel all tend to reduce the market value of the product. A buyer is not readily deceived as to the contents of a barrel of apples, but in making an offer for it he generally offers about what he regards the poorer samples worth. He can not afford to do much better than this.

Another way by which the fruit grower may reap an advantage is by putting his name on the barrel. This tells the buyer at once that he is not ashamed of his fruit. In the commercial world a sample of goods

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offered without the manufacturer's name is always regarded with suspicion. I know of an instance where a man sold his crop of apples at a fine price by simply stenciling his name and address plainly on some barrels of early fruit that he had shipped to market. A commission man traveled over a hundred miles to find his orchard.

Adjourned.

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Indiana Midsummer Horticultural Institute,

UNDER AUSPICES OF THE

STATE HORTICULTURAL SOCIETY

AND

PURDUE UNIVERSITY SCHOOL OF AGRICULTURE,

AT

SOUTH BEND, INDIANA,

Thursday and Friday, August 22 and 23, 1901.

By invitation of the Noble County Horticultural Society the second midsummer horticultural meeting, under the auspices of the Indiana Horticultural Society and Purdue School of Agriculture, was held at South Bend, Thursday and Friday, August 22 and 23, 1901. The meetings were held in the Auditorium Annex. A fine display of fruit was made by the local fruit growers.

After some appropriate music and an invocation by Rev. P. J. Rice, President Hobbs introduced Hon. John B. Stoll, who delivered the welcoming address in these words:*

Ladies and Gentlemen—It affords me great pleasure to welcome to this city the representatives of the Horticultural Society of Indiana and adjacent States. It would afford the citizens of South Bend the greatest pleasure, indeed, to have you, if you could, devote some of your time to a trip about the city for the purpose of becoming familiar with the things of interest that we have here, but we realize full well that you have come here for a greater and a more important purpose, namely, that of considering and discussing the various subjects that have been mapped out for the deliberation of this meeting. We would be delighted, indeed, to offer you an opportunity to visit some of our gigantic manufactories, notably

*The proceedings of this meeting is from the stenographer's report.

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those that pertain to agriculture and horticulture. We would be delighted to have you see the manner in which the plow is made, to cultivate the fields and the orchards, and would be delighted to have you gaze upon the wonderful and marvelous machinery by which wagons are turned out by the thousands, for the purpose of transporting the products of the farm and the orchard; we would be delighted, indeed, to have you gaze upon our principal mercantile establishments; we would be delighted to have you look at our homesteads, with their well-kept lawns, and see the care that has been exercised by our people in planting trees wherever there is room for them; we would be delighted to have you take a general view of this cosmopolitan city, that you might gain something of an idea of the achievements that have been wrought during the past fifty years. But, as I said before, we know that you have not the time. But let me assure you that, while we would be glad to have you see all the notable things that South Bend presents, we, as a people, are more, much more, interested in the consideration and the discussion of the important subjects today before you.

A great deal depends upon meetings of this character, upon the solution of problems, upon the discovery of methods helpful to the husbandman in carrying on his occupation. We realize that in horticulture, as well as in other businesses, obstacles are to be overcome. That is what we are here for. This is pre-eminently a nation to overcome obstacles—obstacles seemingly unsurmountable. Obstacles had to be overcome when the tree of liberty was first planted by the founders of this government; obstacles had to be overcome during the past hundred years, too great, too vast for me to enumerate. Obstacles must be overcome in building up our orchards and affording the people an opportunity to get and to use what every household so greatly needs, namely, fruit of every description.

I sincerely trust that your stay in this city will be one of uninterrupted interest, not only to yourself, but to the thousands of people who will be afforded an opportunity of reading what you may say and what you may determine during the progress of this meeting. And now I desire to state in this connection that I am limited to seven minutes, therefore you will understand I have said practically all that I shall have to say; but permit me to say that scientists have of late applied their agency to the introduction of wireless telegraphy to convey messages far and near. For this special occasion, in order to conform to the limitations imposed upon me by Brother Latta, I take the liberty of introducing my innovation by liberally, though only figuratively, drawing upon all the welcome addresses ever delivered in this broad land of ours to shower upon your intellectual brows all the sweet, gracious and pleasing words uttered by superior orators, in prose and in poetry, with the consciousness that no welcome thus

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extended can have been more hearty, and no greeting more cordial than this we have herewith extended to you individually and collectively. (Applause.)

President Hobbs: Ladies and gentlemen, we will have a response to these words of welcome by Prof. W. C. Latta, Superintendent of Farmers' Institutes.

Prof. W. C. Latta responded as follows:

Mr. Chairman, Ladies and Gentlemen—I lay no claim whatever to being a platform speaker, and that, at once, will raise in your minds the question why I am here to respond to this address of welcome. I may say, briefly, that I thought it would give me an opportunity to explain somewhat the conditions under which we meet and the scope or purpose of this meeting.

On behalf of the persons whose names appear on the program which is to be rendered today and tomorrow here in your presence, on behalf of the visiting horticulturists from other portions of the State, I thank Mr. Stoll for these kindly words of greeting. I am sure that they are as pleased as I am to come to this beautiful city of South Bend, noted for its enterprise—indeed, for its public spirit, for its large and successful meetings. South Bend was chosen for this meeting because it was believed that here we would find the conditions favorable to a successful meeting, and I am sure we shall not be disappointed. It is pleasing to note the preparation that has already been made by, I suppose, people in the near locality, in the way of fruit exhibit. It is quite an undertaking, with no fruit ripe, you might say, to draw on, but I am sure that the friends who are here visiting, as well as myself, appreciate what has been done in that line. It is a splendid exhibit; it is a splendid showing.

And now, just a word or two of explanation, and I shall have performed the first imposed duty. The Horticultural Society was on the eve of abandoning these summer meetings, which it has been holding regularly for a good many years. The reason for that course was lack of funds. Fortunately, the increase in the appropriation for farmers' institutes became available with the Governor's proclamation that we should have an increase for the current year at our disposal. It occurred to me that perhaps we could not make better use of that fund than by holding, in different parts of the State, district meetings, devoted to certain special institutions in our State. Accordingly, four of these meetings were planned, of which two have already been held; the first one, a district dairy institute, at Plymouth; the second, in southern Indiana, at Orleans, which closed last evening; the third meeting we have here today and

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tomorrow; and the fourth, a meeting of the stockmen, especially those engaged in producing butchers' stock, at Huntington, on the 27th and 28th of this month.

It is something of an experiment to undertake meetings of this kind, in the heat of the summer. While the audiences have not been large, averaging, I think, something over one hundred for the five sessions held, the interest has been admirable, and we are hopeful that much good will be the result. We have no question as to the outcome of these meetings held in this center; and with such admirable local co-operation as we have already had, I feel entirely safe in prophesying that we shall have a pleasant and profitable meeting.

One of the gratifying things in regard to these meetings is that, notwithstanding the fact that ladies have hardly had representation on the programs at all, so to speak, yet ladies have been conspicuous by their presence, and in some cases, perhaps, exceeded the gentlemen in numbers. That, to me, is one of the encouraging things—that the women are taking an interest in these meetings, and an interest in agriculture and horticulture, live stock and dairying. The time was when it was very different. I don't know how it was in this particular county, but I know I went into county after county, when institute work began, a little more than a decade ago, when the attendance was made up almost exclusively of gray-haired men; no young men, few middle-aged men, but a lot of old men in the reminiscent stage of life, and frequently not a woman to be seen.

What a change has been wrought in these years! How much it offers for the future! To me it is a very gratifying thing that the ladies come out to these meetings, and that the young people are showing themselves in greater and still greater numbers.

I should like, before taking my seat, to make this appeal to you. Perhaps it is not necessary, and yet it is in my heart to say this: That the good, or permanent good, to result from this meeting, will be its effect upon the rising generation. The older people will not be able, even though they may desire, to change their methods appreciably. With them, things will still go on in very much the same way as they have heretofore. We look to the young people for the adoption of the new and the better ways. And so I would like to ask that you see to it that the young boy, that the young girl, that your children find a place at these meetings. I am sure that they will be interested. You do not know, perhaps, how much interest a boy ten or twelve or fourteen years of age will take in matters of this kind, if he is present; so I bespeak for the boys and the girls that they have a chance to attend this session; I know they will

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be interested and profited, and I know that through them will come the lasting benefits that we hope to secure. (Applause.)

President Hobbs: We are indeed very glad to have with us Prof. S. H. Fulton, of South Haven, Mich. Mr. Fulton has charge of the experiment station at South Haven, and is very capable, indeed, of instructing us on the subject for which he is on the program this afternoon; that is, "The Apple and Pear: Planting and Growing Them." I have the pleasure of introducing to you Mr. S. H. Fulton.

Mr. Fulton said:

Mr. President, Ladies and Gentlemen—In coming into this auditorium this afternoon I felt encouraged in what I have to say by seeing the fruit upon the tables in the back part of the room. It shows to me you are interested in the subject to be discussed, and it shows, by the display of fruits, that you are actively engaged in the work of fruit culture. Coming, as I do, from Michigan, I naturally thought that we have a pretty good fruit State there, better than your State; but I will have to come down a little and say that I now think, and know, that it is a fact that you have gotten together as good an exhibit here as we could have gotten together in Michigan, at this season of the year, and we have been collecting for Buffalo for the last two or three weeks or more, so we know pretty nearly what can be gotten in our vicinity.

I think, too, that the subject under discussion is a profitable one to us, particularly in the line of apple growing, because I do not believe that there is any fruit at the present time which has a brighter outlook for profit and reward and in other respects, than has apple growing, and I will again draw upon my own State as an example in this respect.

Michigan, as you know, has been regarded as one of the leading apple States, and while it is one of the leading apple growing States, I must confess this afternoon that three-fourths of the apple orchards in Michigan are not kept as they should be. Three-fourths of the entire acreage of apple orchards of Michigan are located in the lower four tiers of counties of the State, and it is a rare thing to see in these counties new apple orchards being planted. Occasionally a man sets a few trees out, but it is a rare thing to see trees—new trees—planted. The old orchards have been neglected, have been used for pastures, have been used to grow timothy and other hay upon, and have been used for cow pasture and other purposes aside from fruit growing; the orchards are neglected and are on the decline. In the northern part of the State some new orchards are being

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planted, and some of quite considerable areas, but throughout the lower part of the State there is but very little new planting being done.

What does this mean? I think it means simply this: Michigan will not be able to maintain her good record as an apple growing State, unless some change is made in respect to the growing orchards and the planting of new trees. It shows to us, also, that there is a great possibility within reach of the man who will set out an apple orchard and give it good care, because, since these old orchards are declining, it is only a matter of a few years when they will be gone, and unless there are new orchards to take their places there will not be the supply of fruit. The fruit from a new orchard will always sell to better advantage than from an old one.

Beginning on the new subject, I will state that I will endeavor to consider the two kinds of fruit together, perhaps mentioning some things in connection with the pear especially, a little later, for it can be done and it will save time.

In planting a new orchard, one of the first things to be considered is the location of the orchard. In this connection I believe the first consideration should be the elevation—not necessarily high, but such a degree of elevation as will insure drainage. Drainage, above all other things, is necessary. If the roots of the tree stand part of the year in free water, the trees fail to do well; they decline and finally die out, or produce very little good fruit. Of course, this can be somewhat remedied by drainage, but the drainage should be done before the trees are planted.

The character of the soil does not matter so much in the section from which I come; I will not make that statement as to other sections, because I am not posted as to how it is here. There are those here who will, no doubt, tell us the best soil in this section upon which to grow apples. In the section from which I come I have seen some very fine orchards on light, sandy lands, but usually the sandy land is not considered good for growing apples; but one of the best of our orchards, the best in the vicinity, is on sandy land. It has been given a little better care than some orchards on some clay land, so this may, in part, account for it. The question of soil I will leave to be settled by some one who is better posted as to the conditions as they exist here.

A great deal is said at the present time as to a hardy class upon which to top-work the weaker varieties. There are certainly a good many varieties in this connection. The Spy has been quite largely recommended, a two or three or four-year-old from the nursery. That tree makes a good growth. Bud in the summer and graft in the spring. Some prefer to graft and some prefer to bud and graft, too. There may be some objections to it we don't see now, but there are a number of advantages I would like to mention. One advantage is that on the straighter, stronger,

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more vigorous stock, often we can work some of the weaker growing varieties. For instance, the Jonathan, which is not a very strong grower, may be top-worked upon the Spy and a better body procured for it in that way.

In procuring trees from the nurserymen there are sometimes mistakes made as to the name, and when the trees come into fruiting they are not always absolutely first-class, or we may find that we have not the variety that we ordered. When we top-work them, we can go to some tree we have known for some time, and now produces good fruit, and procure buds to do top-work with. It has been said, but I am not certain, that trees can be brought to earlier bearing by getting wood for grafting, or buds for budding, from trees now bearing.

It may be better for forming the head, in some instances, that we look out in this connection, and I want to say a word in favor of low heading of apple trees. I believe the trees in a great many old orchards have been headed too high; it is more difficult to pick the fruit, to spray the trees, and there are a number of disadvantages in having the trees headed too high. The only disadvantage in low heading is that it is more difficult to cultivate the trees, but with the tools that we have at the present time for working orchards we can usually work close to the tree, and so this objection is done away with.

After the trees have been procured, the matter of distance will have to be considered; that is, after the ground has been prepared for planting. And I should say a word in regard to the preparation of the soil before speaking of distance. The soil should be carefully prepared. To begin with, if there is a hard subsoil it should be broken up. In the section from which I come very little preparation in that respect is necessary, because it is usually loose so the roots can readily make their way down into it; but where there is a hard subsoil it is always better to break it up; it is better to have the ground in condition before the trees are planted. You should have the ground in as good condition as you would like to have it for a crop of corn.

We are more liable, in planting, to plant too close together than too far apart. You can see, all over the country, orchards that have been planted too close together; the branches interlock and make it difficult to spray the trees and to prune them, and the trees can not get enough sunlight and air. By setting them a greater distance apart we obviate this difficulty. I know of the same difficulty of close planting in Cheboygan county. Several, one of which must have been planted within the last four years, were planted twenty or twenty-two feet apart, I am not sure which. I have to have a grower to prune those trees each year, and this keeps them within bounds; but those who have to prune apple trees and apple orchards will appreciate that this means a task. He has, at

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the present time, 16,000 trees; he is a doctor and can not look after the orchard very closely himself, and has to rely upon help, and so we see there is likely to be an objection. It may be that these trees will meet and interfere with each other; at least, the indications point that way. I believe we really should give the trees greater distance—say a distance of forty feet apart.

Mr. Swaim: Do you not think that the planting of trees so closely will shorten the life of the tree?

I am not sure as to that. I know in the pruning of peach trees that some claim if you prune them each year it will shorten their lives; yet, I believe usually it is the contrary or the reverse. Of course, this might not hold true of the apple. In pruning a tree, we thin the tree at the same time. If the trees are not pruned, they bear out on the large branches and break down; that would more likely be the case, and it would be difficult in high trees to look after them properly and yet leave the large branches on, and it is always detrimental to a tree to have the large branches removed.

In regard to the pear, the distance for planting the standard pear, as a rule, should be from twenty to twenty-four feet apart, depending some upon the variety. For the dwarf pear, the distance usually recommended is ten to twelve feet, but that is not the distance in our locality. Some are planted sixteen feet apart, which haven't enough room, and I do not think sixteen feet is any too great a distance for a dwarf pear.

As to the selection of varieties, this, as I have before said, as in the case of the apple, will have to be decided upon by those here present. I notice in the rear of the room a number of varieties which are very productive; no doubt they are the same varieties that grow in our section, and you, no doubt, have some varieties which do better with you than they would do in our section. So you must be the judges in that respect, I not being posted as to the varieties which will be the better producers in this location.

Now, as regards the cultivation of the orchard, as a general thing, I think you will all agree with me that clean culture is the best treatment that we can give an orchard, either an apple or a pear. There are some exceptions to this, however. In the section from which we just came, down to this meeting, near Orleans, Indiana, they find if they keep the ground too clean and allow no vegetation to grow, there is danger of the land washing, and gulleys will be cut out. I was in one orchard that had been injured very much in that way; so it is impracticable to give as clean culture to their trees as we would in Michigan. I don't know about this section.

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In regard to clean culture of the bearing orchard, there are also some drawbacks. When the trees are too highly cultivated there may be greater danger of blight. The conditions of a young orchard are necessarily a little different than a bearing orchard, either in the case of a pear or apple. Of course, where the trees are a considerable distance apart, and there is room for planting some crop, not a hay crop, but such as corn, the ground between the rows may be utilized and the cultivation of it kept up between the rows thoroughly.

I don't want you to think that this cultivation of the orchard should cease after the trees get a good start and are growing nicely. I don't think there is any time in the orchard when good care is more essential than in the first few years, but it should not be neglected after that. It is a very common occurrence for a man to plant a young orchard and the first few years, until it is growing nicely, take very good care of it, and when the trees are about ready to bear fruit, neglect it, cease cultivating it, and turn the stock in to do the pruning.

I remember on a trip last year in Alpena county, of passing an orchard of four hundred apple trees, nice trees, which would have been in good shape for bearing, but the owner had turned in a flock of sheep, and every one of the trees was peeled from the ground up as high as the sheep could reach. That is too often the case. A man spends money for trees, he puts them out, and then neglects them.

As to the care of the bearing orchard: The apple orchard, the old orchards, have usually been allowed to grow up in grass sod and been used for pasture. The cultivation should be continued for the moisture alone, if for no other purpose, and when an apple tree is attempting to mature a crop, it draws heavily upon the moisture, and sod land in dry time is always very dry; so it will be impossible for these trees to get enough moisture; so that even where there is moisture, in a great many instances it would be well to continue the cultivation.

There are other things to be considered. There is the subject of spraying, but as that subject is a broad one, it will be dealt with at length by Professor Webster later, and I will simply touch upon it a little. I do not think there is any operation in orcharding that is more essential than spraying, at the present time. We all know of the pests of the orchard, and it is only a question of time when they will get the best of the orchard and crop, unless we dispose of them in some way. The Bordeaux mixtures are the most effective, and paris green or arsenic of lime, used with the Bordeaux, is very good.

The treatment of the pear and the apple should be about the same, so far as spraying is concerned. We have the same pests and the same insects to contend with. The spraying should be made just before the

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buds open. The practice of spraying with copper sulphate while the trees are still dormant has been recommended and practiced.

Professor Burrough, in his discussion of the apple scab, says the fungi does not winter up in the trees, but winters over on the fallen leaves, and does not attack the growth of the tree until about blossoming time. If we spray at this time with Bordeaux mixture we will get more effective results than with copper sulphate later. But, of course, there is this difficulty about spraying at that time: If the weather is warm, the blossoms come out very rapidly, yet sometimes we have quite a number of days in which the spraying could be done, but it is not well to delay it too long. I know there are some who advocate spraying when the trees are in blossom, but I am not prepared to state just what is best about this. In some States there are laws against spraying at this time. In New York State they have been experimenting in this line some with conflicting results. In a great many orchards some spray while the trees are in blossom, and some while the trees are not, with very good results. It is a matter which needs more study and investigation.

After the fruit is set will come the next spraying, and the most important of all, in both the case of the apple and the pear, particularly in the case of the apple. For a week or ten days after the fruit is set, and sometimes longer than that, the blossom end is open. As most of you are aware, the larva enters at this end, and if the spraying is done just after the blossom falls the fluid will enter the little basin, and when the worm enters he will usually be destroyed at its first meal.

As to later spraying, I am not prepared to say as to the number. Further investigation is also needed along this line, and I don't know as we will ever be able to settle it definitely, conditions are so different, and conditions of the weather, of rain shortly after spraying, and so on; rains may make it necessary to spray again before long.

As to controlling the second brood, it is a more difficult task. After the apples are as large as hickory nuts, the spray falls off, and it is impossible, almost, to get enough poison to adhere. The second brood is not so particular where it enters the fruit. The first enters at the blossom end, but the second may enter at any place; wherever something leaves a place, it makes use of that place of access to the fruit.

As to pruning, the young trees should be carefully pruned, leaving, in the first place, enough branches to form a good head in four or five years in the case of the apple, and possibly more in the case of the pear. The growth should be headed off a little each year, to make a better build. The top ought to be left somewhat open, and not too many main branches left. In our trial orchards at South Haven we have found, as the trees become older, we had to remove the large branches in many cases, which

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is not good for the trees. If this pruning is continually kept up it will not be very difficult, ordinarily, to trim an orchard in the spring. In trimming an orchard it is well to avoid removing large branches as much as possible, but where it becomes necessary, as it does sometimes, that large branches should be removed, with a view of healing over as quickly as possible, I believe it is well to cut close to the body of the tree, leaving a larger wound at first. Where a stump is left, in trimming an old orchard, disease is apt to take place and shorten the life of the tree; but where cut down close to the main branch or trunk it leaves a large scar, ordinarily, but it will heal over sooner, and, as Professor Bailey says, you will not have a monument left there in memory of the branch.

I thank you for your attention.

DISCUSSION.

Mr. Hobbs: The discussion of this topic is now in order. We shall have a short time for discussion, and I hope that there will be the greatest freedom used in asking questions, both by experienced and inexperienced. The only limitations there will be to these discussions will be that of time, and if you wander from the text you may expect to be recalled.

Mr. Rupel: I would like to ask, is a three or four year old Spy not a pretty old tree to tackle?

Professor Fulton: I might better have said a well-grown Spy. It usually takes about two years to grow in a nursery, and perhaps I might better have said a well-grown Spy.

Mr. Rupel: I think one year wood preferable.

Professor Fulton: That is all right, if one prefers it.

Mr. Rupel: I should think about four years old for grafting, and about one year for budding.

Professor Fulton: Yes; a two or three year old tree does very well, ordinarily.

Member: I would like to ask, Professor Fulton, in this connection, whether from your experience, the Spy is, by reason of its freedom from attacks of root rot, or woolly aphis, and its general vigor and strength and desirableness, superior to other varieties?

Professor Fulton: I don't know that it is superior. Our experience with the Spy stock is limited. The trees that we work in

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this way are young. It is true that they are doing very nicely, but as to how well they will continue to do, I would not say from our experience, but only from the light of experience of those who have practiced this method and who have used this tree as a stalk. But I do know that the Spy, being such a vigorous, strong grower, is commonly used for this purpose; but there may be some varieties preferable to the Spy, because of its vigorous growth; I do not say there is not.

Mr. Rupel: Is what you call the Spy from the Spy seed, or from a root grafted?

Professor Fulton: It is procured from the nursery, and it would be a Spy grafted upon a seedling, a Spy top; just the body would be the Spy.

Professor Hobbs: I notice Professor Bailey recommends the Spy root as being comparatively exempt from woolly aphis. This, in the southern part of the State, or south of the Ohio river, is a very serious question; in this part of the State, farther north, it is not of so much importance, because we have cold and severe winters.

Professor Fulton: Our experience with the younger trees is that they are not wholly exempt from attacks of woolly aphis, that there are very many other varieties of trees quite as vigorous as the Spy.

Professor Hobbs: The question in my mind is as to whether it is necessary to single out this particular variety to make a stalk for top-working, but I suppose it will take more time and experience to settle the question definitely and satisfactorily.

Mr. E. S. Smith: In regard to the effect of grafting on its early bearing or late bearing, it is claimed by some that late bearing stock will have its effect upon the grafted stock, and that the Spy grafted in that way, when the Spy is used as a stalk, will not come as early on the stalk as an earlier variety. Has it been your experience to determine whether the Spy is a favorable stalk as to that?

Professor Fulton: Prof. E. H. Powell, of Plymouth, has done some experimenting along this line, using a number of varieties of stalks, and his experience has been that it has not made a great deal

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of difference. I don't know, however, that it has been thoroughly tested and demonstrated; I think that it has not.

Mr. Swaim: The Professor states that the fungi does not winter on the tree, but winters on the fallen leaves on the ground beneath the trees. That being the case, would it not be effectual to use the spraying solution of copper and sulphur in the fall and winter upon the ground underneath the trees?

Professor Fulton: It might do some good, but the fact that the foliage blows about so in the fall winds, and often falls in fence corners and out of the way places, the disease that should continue to live upon it that would be blowing around, would, I think, offset any good that may have been done in that way, and I think it would be much better to wait until just before blossoming time and then spray.

Mr. Kingsbury: I would suggest that to do that successfully one would have to hire a small boy to turn the leaves over for him, that they might be sprayed on both sides. I desire to ask one question. As I was coming down this morning on the train, there sat opposite me a gentleman connected with the Atkins Saw Mill Works, of our city, and in a conversation with him he made a statement that surprised me very much, in regard to the apple orchards in Michigan. He said that they had an agent employed at their factory to gather up apple trees and stumps wherever they could find them, and that recently he had brought down several carloads from Michigan. I said, "Are they old, dead trees?" He said, "No," that they had been cut down, and the hard parts separated from the balance. I said, "You will destroy the apple orchards of Michigan," and he said, "The farmers over there have got an idea that they can make more money out of peach growing than they can out of apple growing, and they are destroying the apple orchards in many places, entirely." I want to know if this is correct—that the peach is a more profitable fruit than the apple. Are not they very wrong in the thought that the fruit growers in Michigan are making less money on apples than on peaches because apples sell for two prices? I think it is just a notion, and that they will make a mistake, because peaches are so very plentiful they are hardly worth shipping at times. Is that the general impression that peaches are more profitable than apples in Michigan?

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Professor Fulton: I am not prepared to say that it is so. I am not informed as to this matter of digging out trees. I have not seen that being done in the section from which I have come, and I have not heard of it before. I think the reason apples have not been profitable to some is that the orchards have not been given good care. Where the orchards are well cared for, I think that, acre for acre, taking one year with another, the apple is as profitable as the peach. However, I am not prepared to say that as a fact. We have an orchard closely located to South Haven, in which there are about three or four hundred trees—not a very large orchard. That orchard has been carefully cared for the last three or four years, pruned, sprayed and plowed, and it has produced each year, since it has been given that treatment, a satisfactory crop. The crop has been sold this season upon the tree. The buyer was a Chicago fruit dealer, and he did not even come to examine the condition of the crop. He asked if we had as much as we had two years ago when he bought the crop, and we said we did, and he bought the crop without seeing it. I mention this as one instance in which the profit is extremely good. I am not prepared to say the apple is in all instances as profitable as the peach, but even in our neglected orchards they have often been the most profitable part of the farm. It remains to be seen, if given good care, what can be done. The market is always good for good apples.

President Hobbs: The next number on the program is "Feeding the Trees," by Professor Huston, State Chemist, Lafayette. I have the pleasure of introducing to you Prof. H. A. Huston, who will address you on this subject.

ORCHARD FERTILIZERS.

BY H. A. HUSTON, STATE CHEMIST OF INDIANA, PURDUE UNIVERSITY.

It is only recently that much attention has been given to the use of fertilizers in orchards. When the country was first settled fruit trees were planted in the virgin soil and abundant crops of fine fruit are said to have been produced. This result may have given rise to the common opinion that fruit trees, like forest trees, require very little attention and that they can obtain a full supply of plant food from the soil. The bad condition of many of the fruit trees in the State and the small amount of fruit produced per tree leads us to believe that this opinion is not well founded.

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The growth of a forest and that of an orchard are very different. In the case of forest growth no crop of any kind is removed, and the foliage and fruit are returned to the soil and decay on its surface, forming a layer of vegetable mould rich in plant food and humus which is such a valuable ingredient of virgin soils. So far as active soil fertility is concerned the growth of a forest must be regarded as a process of soil improvement.

On the other hand, the growth of an orchard is a process of reducing soil fertility, for crops of fruit are removed and even the fallen leaves do not always remain on the ground around the trees. Ripe leaves may produce some organic matter in the soil, but they contain relatively little fertilizing material; for while the leaves evaporate much plant food, most of the plant food itself passes to the fruit and new wood before the leaves ripen.

The growth of an orchard also differs from that of our common farm crops in that the orchard growth is divided into two distinct periods, the period up to the beginning of fruit bearing and the fruit bearing period. During the preliminary period we have to provide only for the growth of the tree, but after the tree comes into bearing we must provide for both the growth of the tree and production of fruit. While a crop of fruit is being produced the tree must also store up material in the buds and young wood for the next year's needs. This requires a constant transfer of plant food throughout the whole growing season. In order to meet this requirement the soil must contain available plant food throughout the season. This means that there must not only be certain chemical elements present in an available form, but that there must also be water enough present at all times to permit these elements to pass from the soil to the trees.

Proper drainage, deep plowing, subsoiling, mulching, and frequent surface cultivation during the summer all aid in storing and retaining the moisture during the season when it is of the most vital importance that both fruit branch and bud should be making a continuous growth. Without a sufficiency of moisture the best fertilization can not produce its desired effect.

Fruit raising is continuous cropping of one kind and it is well known that the continual production of one crop on the same land demands better fertilization than is required when a rotation of crops is used. The production of a rotation of crops in a young orchard is not a rotation so far as the young trees are concerned, but is too often only a means of removing plant food that is sorely needed by the trees.

The chemical elements that make up trees and fruit are the same that enter into other crops, but the relative amounts of these elements are different. There is a common opinion that the element nitrogen contributes

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most to the growth of leaf while potash gives color to the fruit. The safer basis on which to proceed is to remember that a suitable supply of all the elements of the plant are necessary for the proper development of tree and fruit. Certain conditions may indicate a lack of one or more elements. A tree with light colored foliage may mean a lack of nitrogen or it may mean a general lack of plant food. Lack of color in fruit may indicate a lack of potash or it may mean a lack of general vigor due to general starvation. The failure of vigorous young trees to produce fruit is often due to a lack of available phosphoric acid. Late ripening of fruit is often due to the same cause. In the presence of enough of the other plant foods, lime tends to promote a stocky growth of the tree and ripening of the wood.

Where orchards are set out on land that has been under cultivation for a considerable time it may happen that the land may have enough available plant food of all kinds to provide for the growth of the young trees and the crops that are often planted in the young orchard, but that shortly after the bearing period begins, when there is an enormous increase in the food requirements of the orchard, one or more elements may not be present in sufficient quantity. Other elements may be present in abundance, but the crop is limited by the deficiency of the one that is most nearly exhausted.

Since the effect of the fertilizer applied to an orchard is expected to extend over a series of years, slow acting fertilizers may be employed if desired. A formula that has proven profitable in the East is made by mixing—

100 pounds ground bone,
100 pounds acid phosphate, and
100 pounds muriate of potash.

Calculated to the percentage basis, this mixture would give—

Nitrogen	1 per cent.
Potash	17 per cent.
Available phosphoric acid	8 per cent.
Insoluble phosphoric acid	5 per cent.

This mixture is recommended for trees in bearing or just ready to bear. Another formula recommended for use at the time the orchard is set out and when the land is of poor quality is—

Bone	150 pounds
Muriate of potash	100 pounds

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Calculated to the percentage basis, this would give—

Nitrogen	1.8 per cent.
Potash	20.0 per cent.
Phosphoric acid	13.0 per cent.

Sulphate of potash may be used in the above mixtures instead of the muriate if desired.

These mixtures are used at the rate of 400 to 1,500 pounds per acre. On medium soil 1,000 pounds per acre is a fair application. The best method of application is to scatter the fertilizer over a considerable area, about twice the diameter of the tree top, about the tree and then plow under. Since the roots grow fastest where the food supply is the best, this method will tend to produce a broad and deep root system, a matter of much importance, especially in seasons of drought. When it is necessary to apply fertilizers on sod under the trees only the most soluble forms of fertilizers should be used. In that case to obtain the immediate effect of the first formula given we would use—

Nitrate of soda	20 pounds
Acid phosphate	250 pounds
Muriate of potash	100 pounds

The most conspicuous thing about the above formulas is the high percentage of potash—more than ten times as much as is found in the average "complete" fertilizer for general farm crops.

A comparison of the plant food removed by fruit and wheat may show the reason for this.

Twenty crops of wheat, 15 bushels per acre, remove 660 pounds nitrogen, 324 pounds potash and 211 pounds phosphoric acid; twenty crops of apples, 15 bushels per tree, 35 trees per acre, remove 1,337 pounds nitrogen, 1,895 pounds potash and 310 pounds phosphoric acid.

The period when the wheat plant uses most of its food is during the months of May and June, when moisture is usually abundant enough to permit the wheat plant to utilize all the available plant food in the soil. In the case of the apple the food is most needed during months when the moisture is least abundant. Under these conditions the best course is to provide an abundance, even an excess, of plant food so that during the time when there is sufficient moisture the plant may get its food to the best advantage. In the case of the first two formulas given there would be no danger of loss of fertilizer ingredients from leaching and what was not used one season would be ready for use the next.

It will be noticed that the above formulas contain very little nitrogen. There are several good reasons for this. The most important are the high cost of commercial nitrogen, the danger of loss from leaching,

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and the tendency of large quantities of quickly available nitrogen to promote too rapid growth of the vegetative parts of the plant.

The best source of nitrogen for orchards is farmyard manure and clover or other leguminous plants. These furnish nitrogen in a form that will gradually become available, and that is not liable to severe loss from leaching. At the same time they furnish a supply of organic matter to the soil and this organic matter is of high value in maintaining a good soil texture and in increasing the water-holding capacity of the land. Care should be taken not to carry manuring to excess or to continue clovering too long since we would then be likely to promote the excessive growth of wood and foliage. I have no doubt that the amount per acre of fertilizer recommended above will at first sight appear excessive, especially in those sections where fertilizer is used only on the wheat crop and where the expenditure for fertilizer seldom exceeds $1.50 per acre. It should, however, be kept in mind that one fertilization of an orchard provides plant food for several years. Moreover, if it is found that the profits of an orchard are increased by the increase in the use of a fertilizer, then the amount used can not be considered excessive until the most profitable amount has been exceeded.

Good fertilization and good management will do much to secure a crop from the orchard every year. This means a supply of fruit to sell in off years when prices are the highest and profits the largest.

The question is sometimes asked whether fertilizers have any influence on the diseases of plants. While there is no very conclusive evidence on the direct effect of fertilizers in combating plant diseases there is no question that a properly nourished plant is in better condition to ward off the attacks of plant diseases than is a plant that is partially starved.

Formerly it was difficult to obtain the raw material needed to compound such fertilizers as are mentioned above. Now the State provides by law for a registration and efficient inspection of all fertilizer materials used in the State, and under this law all the materials have been registered and can be purchased in the markets of Indiana. Purchasers should refuse to receive any fertilizing material unless it bears the tag of the State Chemist showing the guarantee, for this label fixes the legal guarantee of the grade of the goods, and unless it is attached to every package the person, seller or buyer, in whose possession the goods are is liable to rather heavy fine. Rational feeding will do as much for plants as for animals, and a few comparatively inexpensive experiments will convince any careful farmer that he can convert an unsightly and unprofitable orchard into the most paying part of his property.

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DISCUSSION.

President Hobbs: As we have another subject to come before us this session, we shall give only a few minutes to the consideration of this topic, and I trust you will be very brief in your discussion of this subject.

Mr. Rockhill: I would like to inquire if this could not be purchased in the proper amounts and mixed by the farmers themselves, and thus save some expense.

Professor Huston: Of course it can be done by the farmers themselves. I see no reason why you can not mix, as well as anybody else, if you take the pains to do so, this material we have been talking about today. If you buy anything like this from a fertilizer house, they take what they call "stock stuff" and put so much potash into it. They will tell you about the marvelous and wonderful means they have of mixing it, and make you think you can not mix it yourself; that the mixing could not be done at home, by the way these people talk, when, as a matter of fact, common stock is made up and in most cases the potash is added from time to time as the orders come into the house. If you know what you want and take the pains to buy it from reliable people, there is no reason why you can not do it yourself and save anywhere from two to eight dollars a ton in the operation.

Mr. Rockhill: I have been trying to use fertilizers on different crops, and haven't succeeded in getting any benefit from any I have used until this year. I had an experience of sowing fifteen acres of clover in corn stubbles. I used on five acres a mixture, a fertilizer, of five per cent. I went yesterday, after this hot, dry weather, to look over the field. On the next five acres, I put nothing; on the third five acres I hauled manure, ten loads to the acre. Yesterday I found that the clover, where I used the fertilizer, has a fine stand, there is a vigorous growth of young clover; where I did not put anything on, the clover is practically burned out; where I put the ten loads of manure, I find the clover is not quite as good as where I used the fertilizer. About two per cent. is the highest you can buy in this market, of fertilizer. I wanted to use this fertilizer and I could not get it here, so I went to St. Joe for some. It did not have the State Chemist's tag on it, so, I suppose, I violated the law.

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Mr. H. E. Haines: What kind of a fertilizer will barnyard manure, fresh made from stock, and unbleached ashes and ——— make?

Professor Huston: You would be short the phosphate. Your trees would be more liable than others to be attacked with fungous diseases. With that mixture I would add some acid phosphate. The mixture you speak of has potash and nitrogen enough, but not enough phosphate.

Mr. Grossman: What time would you apply this to a three year old orchard?

Professor Huston: Whenever it is convenient to plow the land —whenever it is convenient to plow it under. It then fixes it in the soil and it stays there and the tree gets it.

Mr. Grossman: Is it important to plow it under?

Professor Huston: It is. If you do not, you go to feeding the grass and weeds, and it will also tend to bring the roots too near the top of the ground, and it is desirable to get it under as deeply as you can. If you don't want to do that, you ought to substitute bone meal, acid phosphate or material that will be more soluble. The bone meal can be sowed on top of the ground, and if you decide not to plow the ground it would be the best thing to do, because it will go down in the ground despite itself.

Mr. Grossman: Is it difficult to get pure potash from the importers? Can the buyer get it directly from the importers?

Professor Huston: The only people you can get it of are dealers. The importers can not sell it to you.

Member: There are importers in New York—importers of potash.

Professor Huston: But they sell it to the mixers, and they in turn sell it to us.

Member: One has a right to buy from importers in New York, and use it, hasn't he?

Professor Huston: No, you have not; not if the prosecuting attorney of the county catches you at it, or with it.

Member: Isn't it possible to buy material in carload lots, of guaranteed analysis?

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Professor Huston: Yes; but it must be the State's analysis, not the manufacturer's analysis. The manufacturer's analysis may vary from the State's analysis two hundred per cent. of the total value of the goods. If the State says it is guaranteed to be one per cent., it has got to be one per cent.; if the State says it is three per cent., it has got to be three per cent. If the guaranty reads from one to three per cent., which is the manufacturer's form of guaranty, it means it is only one per cent. The State says it must be made definite, and the drug must be what the guaranty says it is. When you get it with the Government's guaranty on, you know what you are getting.

Member: I would like to ask Professor Huston a question. I have three hundred bushels of ashes. My orchard has been sowed to oats. I want to know if it is safe or wise for me to apply the ashes now, or if it would be better to wait until spring, before I apply it to the orchard?

Professor Huston: What kind of ground have you?

Member: Gravel and loam.

Professor Huston: I think I would put the ashes on in the fall, to get the best results, if your orchard does not bear very well; when you have the effect of the ashes, if you will apply the soluble phosphate later, you will get the effect of that.

President Hobbs: This is a very interesting subject, but we must pass to the next for want of time to discuss it further. The next topic is a very interesting one, to be treated by a gentleman very capable of presenting it to us—the Hon. Charles W. Garfield, of Grand Rapids, Michigan. His subject is, "Forestry—Its Relation to Fruit Growing." I have the pleasure of introducing to you Hon. Charles W. Garfield.

Mr. Garfield spoke as follows:

When I came over here today from Vicksburg, I sat behind a couple of ladies, and the window was up. It was rather warm in the car, and the cinders came in in immense quantities, and most of them landed in my lap, and my ears and eyes and all around, and after a time a gust of wind came and took some of the cinders in the lady's face. She immediately shut the window. I said, "Thank you," and she was mad. (Laughter.) It illustrates that sometimes you can not assume to discuss a question

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with people that they ought to have discussed, that they are unwilling you should discuss. That has been oftentimes the case with the forestry question.

Some years ago, when I was engaged in making programs for farmers' institutes, I placed on one program a topic entitled "Mules." The man who was chosen for the topic seemed to think it was put on the program simply to sandwich in something to give a little life to the program, and he treated it jocularly, and made those who listened to him laugh. You know you might make a lot of fun of mules, if you wished to, for the purpose of entertaining people; but I had something else in view besides to sandwich in a jocular address. I had a man follow him, in a discussion, who knew something about mules, and who gave some sharp, keen advice in connection with the raising of mules. The object was, that while the audience, as a whole, thought Garfield was a queer fellow to put "Mules" on the program, that even though one man failed on good ground, somebody would learn something. The other day I met a man on the street, and he said, "Garfield, do you remember the mule discussion we had about twelve years ago, in Michigan?" I said, "Yes." He said, "That was the making of me. I immediately went north and began raising mules, and it has been a most profitable business; I have been raising mules ever since then, and I shall continue to raise mules, and that discussion was the cause of it."

So, in discussing the forestry question, people generally don't think it is an important question; that it has been put on the program to fill in, perhaps to entertain for awhile; that it has just been sandwiched in, simply because people have not felt the necessity of discussing along the forestry line. After all, I usually keep availing myself of every opportunity I can to say a word along forestry lines. I began it fifteen years ago, and as long as there is moisture enough in my mouth to allow me, I shall continue talking, because I believe that it is today one of the most important problems that confronts the agriculturist of the middle west. People do not take to a new thing until in some way they are pinched to it, and we are now getting to where we feel the pinch in connection with the loss of our forests.

I did not want to take too much of your time in one discussion, so I sat down to a stenographer and dictated what I have to say, that I might tell you more in fewer words, and that I might not omit some things which I would desire to say, and I will take just seventeen minutes' time to read this paper, and the rest of the time will be given to the discussion, which I consider the most important part of the topic. I believe we get more from the discussion than anything else, and I hope that when I am through

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reading, many of you will take part in the discussion, and that we may make it as profitable as possible in the time given us for the discussion.

[Mr. Garfield was too busy to furnish a copy of his paper, and this is an abstract taken from a newspaper.]

There is much more in the subject than might at first be thought, for the forest and orchard to an extent seem incompatible. He gave this instance in illustration of his argument: "Two or three years ago I visited the magnificent fruit farm of Roland Morrill, at Benton Harbor, and I found he had saved several acres of timber right in the midst of his peach orchards, and I asked him how he could afford to do this on land that was so especially adapted to the growth of the peach, and he replied that he could not afford to do otherwise; that as this growth added to the value of all the rest of the land for peach growing he could not afford to destroy it, and he deplored the fact that people generally were cutting all of their timber and thus rendering the general conditions less suitable to the growth of the peach."

He said that "another incidental value that is not often spoken of is that which comes from the growth of nut-bearing trees. Few people are willing to admit the great income that can be produced from ground devoted to the growth of nuts that are adapted to our climate and condition. In the growing of this commercial commodity one is carrying out the spirit of restoration of timber areas, and at the same time getting incidental value that is not in the least imaginary, but as certain as any other crop we produce."

DISCUSSION.

President Hobbs: We are very glad, indeed, to see this hearty approval of this paper just read by Mr. Garfield. It indicates that there is a growing sentiment along the lines just laid down by Mr. Garfield. I consider this a very interesting and a very profitable paper, and hope that you will spend a few moments in discussing it.

Mr. McMillan: I would like to ask Mr. Garfield what was his object in planting a grove of mulberries; did he plant it for the birds in the first place, or for what?

Mr. Garfield: I did not know enough then to plant them for the birds; I was not far-sighted enough. I planted them because about ten years ago the Kansas agricultural papers talked so much about the Russian mulberry as an important tree. You see some fellow had Russian mulberries to sell and he was using the papers

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to sell them; he was using that as an advertisement, and that is why I put them out.

Mr. Rockhill: Our draining the marshes does not affect our timber, or do you claim it is destroying the timber?

Mr. Garfield: I don't know positively. Of course, draining the country into the rivers and getting the water out of it in that way possibly does not leave enough water back in some places. You know in horticulture about ninety-nine per cent. of our products are water, so it is a pretty important thing to hold it as long as we can and get it into the fruit; so that anything that gets the water quickly away from it is hurtful to fruit growing.

Mr. Frame: I would like to ask this question: It is not so much in producing rainfall as that it affords so much greater evaporation. Evaporation upon the open fields is forty-four per cent., while evaporation from forests is twelve. And with the timber cut out the water evaporates so quickly, and then in addition to that, if the water is all drained off and run into the rivers, that is where the great detriment is done.

Mr. Graham: One man on the floor today told us to drain our land for trees, and the other told us to leave the water in the soil to get it into fruit. What kind of a conclusion are we to form from that?

Professor Huston: I guess that is all right. The fact is, it is not so much upon the amount of water as the distribution of the water you want. If you were to adopt the suggestion I threw out and irrigate, you would simply pile up some water already fallen and put it on the land again. I think there is no question about the fact that it is desirable to have satisfactory drainage, because everyone who knows anything about raising plants of any sort knows they will not grow very well with the roots in the water. We must get the general water level low enough so that there is satisfactory drainage of the soil where the trees are to grow, and then irrigate, if necessary. If we had thirty-three inches of rainfall in this country, and it was evenly distributed throughout the year, we would not have to irrigate any. The great trouble is that we have it for five or six or eight or nine weeks and then we don't have any more at all, and that was the time I was talking about—when we have so

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much rain. I don't think what has been said has been inconsistent with getting stagnant water out of the ground.

Mr. Witmer: I wish to ask Mr. Garfield whether, from experience, it is better to set a grove of miscellaneous trees than to have the trees of one kind?

Mr. Garfield: I can simply relate my own experience. I planted this grove ten years ago, and I didn't know very much about forestry matters at that time—practically nothing except what I had read. A man reads a good deal sometimes, and thinks he knows a lot, and then finds that he is very much mistaken. I got a lot of young trees, and I had just got the land ready and was going to plant them when I had to leave home, and I had to leave the whole thing to my man; so I said to him, "You plant this kind here in this block, and that in that block, and another in that block." I had mulberry, box elder, white ash, catalpas, beeches, black ash, white maple, Norway maple, basswood and birches. The result was this: I lost all of my beeches. I didn't know the beech ought to be covered up. I ought to have observed that beeches always grow best where shaded, or where it is dark. So the little block I had planted in beeches originally hasn't any beeches on it. I afterward, when the beeches failed, took that block and planted on it some of most everything I had. That acre today is the most satisfactory one I have. If I were going to plant again I would give some thought to the method with regard to what trees need protection and mix the varieties.

Mr. Witmer: That is something like a case we have in our own county, where a man had forty acres or more planted in a grove of walnut trees. The trees were doing nicely until two years ago, one hard winter; in places in that grove they lost all their walnut trees. Up to this time they had kept that orchard in a good state of cultivation and the trees were growing rapidly. I believe it would have been better had they set out a variety of trees, and then had the walnut died they would yet have some other trees—trees that could resist the cold much better than the walnut. Not having done that, there are empty spaces which very much mar the appearance of the orchard.

Mr. McMillan: There is one thing I desire to mention, that has been worrying me for a good many years, and that is the way our

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timber has been used up in lumber, destroyed and wasted, and the way it is at the present time being cut and sawed up. Forty or fifty years ago we had a good many mills down in our section, cutting nothing but poplar and black walnut; after they got that cut, the mills disappeared, and we thought the timber would be left. In a few years they came back and cut the white oak, and that is now all gone. Now we have, I think, four mills cutting up everything in the shape of poles or anything else three inches and over, it don't make much difference what kind of timber it is. In view of this, we will soon have all of our timber utterly destroyed. I hope Mr. Garfield will consult some of these farmers right here, who are cutting their timber; I suspect some of them are cutting and hauling to the mills right now, getting what little money they can for it. I hope he will hit them and hit them hard, if he has not already done so.

Member: Timber growing depends largely upon the kind of soil upon which the timber is planted. I have had some experience in regard to the growth of timber, and certain kinds of timber will do well, where certain other kinds will not. For instance, the walnut, poplar, sugar and basswood grow largely on some kinds of soil. Would it not be well, when we are going to plant trees, to learn first the kind of trees that will grow in the soil which we have in which to plant them?

Mr. Garfield: Unquestionably so.

Thereupon the Society adjourned until 7:30 p. m.

EVENING SESSION.

Thursday, August 22, 7:30 P. M.

President Hobbs: The first topic is "Relations of Forestry to the Industries," by Prof. W. H. Freeman, Secretary of the State Forestry Commission. Mr. Freeman will now speak.

Professor Freeman: Mr. Chairman, Ladies and Gentlemen—If there is anything I like it is to see people comfortable. It is very warm tonight, and if it is more comfortable for you to remove

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your coats, do so. I assure you that is the way I have spent the greater part of my life, with my coat off. If there is anything I am proud of, it is the fact that I have always been a farmer, and am yet. If I could say anything to the young people and to the fathers and mothers that are present here this evening, I would say this, that the best experience that a young man can have is going out and getting a real first class farm experience.

Before beginning with the paper which I have prepared, I wish to make a few preliminary remarks. In assuming the duties of Secretary of the State Board of Forestry, I feel that I have assumed an educational responsibility which is equal to any other educational possibility that the State could well give to any one man. The subject of forestry in Indiana is an educational one, and I shall try to present it in that way. That I might say in the shortest amount of time the few remarks I have to make to-night, I have written it out and will read it to you. While the many statements in this paper may seem to be dry and uninteresting to you, let me say to follow them closely and carefully, because in these figures I shall attempt to give you the relation of forestry to the industries.

THE RELATION OF FORESTRY TO THE INDUSTRIES.

BY PROF. W. H. FREEMAN, INDIANAPOLIS.

The common view and estimate of forestry is not the best one. It is considered by many as a fad and an origination of office to satisfy the longing of some aspirant who is a fanatic on trees. Such is not the case. Forestry is a matter of the very deepest vital importance. The lack of rigid legal enactments and their prompt enforcement has caused a loss in an absolutely needless manner of some of the natural resources of the State which have been the means of the best prosperous conditions in the institutions of every kind.

I need take but a fact to illustrate the above statement. Ten years ago, when natural gas was found to be abundant in regions of Indiana now known as the "Gas Belt," I dare say not a person gave any thought to the necessity of conserving that great blessing. As a citizen of that community, I know of the thousands of flambeaux that lighted every door and barnyard, pig stye and roadway till travel was as convenient by night time as by day. I do not need to enumerate the manner in which natural gas was consumed just because it could be, without regard to any loss in the future. Because natural gas was abundant and the most

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convenient fuel as well as the best, Indiana now is a great manufacturing State through which it is greater in its every other kinds of industry. The natural gas has done a great work, but you know the gas conditions now and the strenuous legal efforts to conserve the fragment, and the still greater skirmishing efforts to get fuel into these districts to retain the manufacturing concerns in their present localities.

This presentation of the gas question has no connection with the topic of forestry and industries, except the excellent example it affords of the neglect and wanton waste of the natural resources and the results which follow. It is the most fitting illustration that you and I have seen from the beginning to its almost completeness. The timber problem is one of vast greater significance to industrial welfare. Timber has been and will continue to be one of the most used materials of general use. Wood possesses properties which can not be substituted, and its perpetuity is an absolute necessity.

To state briefly the meaning and purposes of forestry will make clearer the relation it bears to the industries. Forestry does not mean the hoarding and prevention of the use of timber, as many with whom I have talked seem to think, but it means the right conservative use and propagation of timber. The duties of the department as set forth in the law are to collect, digest and classify information respecting forests and timberlands and to give information and direction for forest and timber cultivation, to establish State forest reserves and to be a bureau of information on timber and timber conditions of the State to associations and meetings of lumbermen, timber dealers, woodworkers, farmers and engineers of maintenance of way of railroads. These duties connect it directly with the industrial institutions. The purposes of the department of forestry and the plans of action as they are directed for attempted execution by the board may be stated in the following sentences:

1. To act as a bureau in the best sense for information on timber and timber conditions, forest and timberland promotion and cultivation for Indiana.

2. To incite the fostering and perpetuation of the present timber areas in the State by inducing a better saving use of the forest product and the continuation of timber tracts in forest as against clearing them off and putting them into agriculture when a forest crop has been harvested.

3. To stimulate the planting of the different forms of waste lands to timber of the most valuable kinds suited to their soil and moisture conditions.

4. To stimulate the planting, cultivation, and retention of good agricultural lands in the best merchantable species of trees to the extent of a

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reasonable ratio between the agricultural and timber areas, as shown to be for the best good of the general welfare.

5. To encourage shelter and ornamental tree planting around premises, orchards, along the highways and on public grounds.

6. To establish State forest reserves where intelligent forestry may be executed and the results given out for the benefit of the people of Indiana.

These plans rightly carried out will be of much importance to industrial Indiana in agriculture, manufacture, building, construction, labor and trade. The agricultural interests are being affected by the great deforestation that is now under such strong headway. I do not want to be understood as claiming that all the agricultural disasters are due to the lack of forests, but I do want to be understood as saying that the large clearing away of the forests is responsible for some of it.

I am satisfied that our changed climate is largely due to the denudation of forests. The almost certain drouth of summer and the spasmodic extremes of freezing in winter, the more destructive winds and hail storms are all results influenced by the absence of a proper forest area. You as farmers know the results of the drouth, freezing and storms to your pasture, fruit growing and grain crops, and their hinging relations to stock raising.

The argument is that forests are sources of moisture to the atmosphere, conservators of the rainfall against rapid evaporation and a means of storage for fallen moisture by reason of the forest litter and roots to direct it into the earth and hold it.

Every law of climatic equilibrium is made contingent on right afforestation. I do not care to enumerate them here, because I feel you know them and can make the applications. But I wish the following statements to be considered in the relation of forests to agriculture:

1. Evaporation in open fields is 44 per cent., as against 12 per cent. in forests.

2. Water falling on open fields soon flows over the surface to streams and does not remain to do much good to the soil.

3. The rainfall in forests is directed into the soil and retained by means of the roots, litter and humus to be given off gradually to the atmosphere, streams, springs and soil.

4. About 75 per cent. of the annual precipitation is due to transpiration and evaporation from forests.

5. The temperature of forests is much more even and moderate than that of open regions.

6. The spasmodic disturbance of climate are most frequent and destructive in disafforested regions.

7. That year by year sees more and more the drying up of the streams.

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There is no industry so dependent on right climatic, soil and moisture arrangement as general agriculture. Fruit growing is most disastrously affected by the drouth and freezes. Orchards need protection from the freezes, extreme evaporation and storms by the planting of good shelter groves. The removal of forests from near fruit orchards has given sway to the insects and worms on both trees and fruit in the absence of birds to devour these pests.

The relations of forestry and agriculture are very vital in farm utility of fences, fuel, building and protection of premises. The subject of fences is one that is now perplexing farmers, and farm philosophers and economists are devoting much time in experimenting for a good solution of the problem. Iron and cement posts are expensive and unsatisfactory. Cedar posts are good but expensive. Systematic fencing is rapidly forcing farmers to a large expense, and consuming the income of the farm. What is to be done? To my mind the solution is easy, first class and inexpensive.

Every farmer should grow his own fencing material, especially posts. There is not a farmer but that can spare a small patch of ground and cultivate it in either the hardy catalpa, black locust, Kentucky coffee-tree, Osage orange or Russian mulberry, or all of them. Or if he has a woods lot he can grow them in it along with the timber. These species are the most lasting timbers in contact with the soil and the quickest growers. Posts and ties can be grown from them in from eight to fifteen years in quantities of from two thousand to five thousand per acre. You can see the value of it. There are instances in the State where farmers saw this twelve or fifteen years ago and are now fencing their farms from home grown posts. I know of one party who has fenced a one hundred and sixty acre farm from an acre of waste land planted in black locust. and has an abundance of posts yet on hand.

The matter of fuel material is not of such vital concern so long as the coal regions seem to be so vast and productive, together with the cheapness of it. But if farmers desire to produce their fuel they can do so in a short time and with profit. A number of trees which grow very thriftily are adapted to every soil in Indiana. Protection groves may be made to serve as sources of fuel and posts combined.

The growing of timber for construction and building purposes is a much more serious thing. Trees to become large enough for lumber for such uses must have a long time in which to grow. But poplar, ash, walnut, elm, lin, and all the oaks except the white oak are good rapid growers and under cultivation will reach good mature sizes in from twenty to thirty years. Instances of trees from eighteen to twenty-four inches in diameter and sixty to eighty feet in height are known to have grown in the above period of time. White pine is a most excellent tree to plant for these

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purposes. The white oak, while slow, is yet better than credited, and for its high value in construction and manufacture is a good paying tree to grow. The same with hickory.

The next most important industry in relation to forestry is manufacture. This is more distant in relation to agriculture, but in its remote relations to general trade, labor and timber demand makes it the most vital institution to be considered, and in it is to be found the greatest necessity for a vigorous forestry movement.

In the State are to be found near five hundred exclusive wood consuming manufactories. These consume daily many thousand cubic feet of wood from the large tree to the small undergrowth. These wood institutions employ about fifteen thousand seven hundred persons daily, and pay in aggregate wages near four million seven hundred thousand dollars annually. The capital invested in these factories is near twenty-five million dollars, and they are paying for the raw timber product of manufacture about twelve million five hundred thousand dollars annually. The aggregate finished product in value reaches about twenty-two million dollars annually. A safe and entirely reasonable estimate will allow the assertion that the industries using wood as the principal raw product of manufacture gives the State an annual money circulation of about forty-five million dollars.

These figures give an idea of the magnitude of timber to the industries in the State. The continual destruction of forests with no decided attempt at reforestation will soon find us without timber. Calculations carefully made by the United States Bureau show that at the present rate of timber consumption the timber in the United States can not last more than sixty years if no attempt is made to conserve and afforest. The annual consumption of wood is three hundred and fifty cubic feet per capita.

Eighty years has witnessed the removal of eighteen million one hundred thousand acres of the timber from the surface of Indiana. Most of it had to be removed for agriculture and at a time when there was no demand for it, but a vast quantity was wantonly destroyed and is being needlessly wasted now. The actual amount of timber area in Indiana today can not be estimated at more than one and a half million acres to supply the demand of timber to a greatly augmented manufacturing industry. It is a plain open question. Can we have the industries without the material to supply them? The problem may not concern us in our time, but is the world going to cease when we leave it? We owe to future generations a duty for having lived before them.

Every law of labor and trade is of the deepest concern in considering this proposition of forestry. A scarcity of timber means higher prices for raw material. This means higher prices for the finished product or labor

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must be reduced. Either will be to the detriment of the farmer. When things so arrange themselves that the industry can not be sustained, the industry must cease and will cease. Any state or condition of things that will disturb the present prosperous triple relation of agriculture, manufacture and commerce should not be allowed encroachment.

I do not care to prolong the argument. It seems clear to me that forestry is a more serious question than is generally given credence. I appeal to you as citizens to co-operate with the members and board of forestry in matters of timber promotion.

There are many ways in which this may be done, but I call attention to the three following plans as most beneficial and necessary:

1. Insist on the sensible systematic harvesting of the forest crop so as to secure the young timber and the retention of the tract in forest for successive harvests. I am satisfied forest areas systematically harvested and continued will pay better year for year at less labor than if put into agriculture. It will operate as a savings bank.

2. Plant the waste tracts of land in trees of the best economic and commercial values. Waste lands planted in railroad tie and post trees will be found to be a paying industry. The growing of aspens and cottonwoods for paper pulp manufacture, which is now one of the coming large industries in the State and which is paying good sums per cubic cord for such material in bolt form delivered at their mills.

3. Discourage all tendencies which have in them elements of extravagance, waste and destruction of timber. Encourage intelligent legislation to induce tendencies of forest planting and conservation.

President Hobbs: I am very glad, indeed, to have this excellent paper by Professor Freeman. We promised Mr. Garfield an opportunity to discuss a subject presented by Professor Latta.

Professor Latta: "What Nature Herself Will Do Toward Restoring Forests if She Has a Chance."

Mr. Garfield: I don't want to intrude a moment on the time Mrs. Meredith should be given, so I will take two or three minutes only. I believe if nature is given an opportunity she will clothe the earth with forests; she will do wonders if only half an opportunity is given. The reason I believe this is, because in the State of Michigan we have immense areas of cut-over lands that are worthless. They are not worth anything as an investment, now. If you inventory them at one cent an acre, you overdo it; but they will grow timber if given a chance. If the State of Michigan will simply prevent fires and will keep out the thieves, God will cover

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that country with a beautiful growth of timber in time. Poor lands take longer; good lands give quicker returns; but I believe that those poor jack pine plains that are today an abomination of desolation, because the fires have swept over them time and again, can be made, in fifty years, to have a real value to the State, and the State need do nothing except to keep the fires out, and when the trees get big enough to be stolen, to keep the thieves out. That is what we are agitating in the State of Michigan.

In traversing that country, that poor country, where the fires have been kept out and there is an occasional tree that has been left, we find not poor jack pine simply, but we find white pine, Norway pine, oak, and other valuable timbers coming up on those poor barrens; and this relates to that poor, worthless land of the State of Michigan. I am satisfied, I feel safe in saying, that the next crop, on all that cut-over land, will bring to the State of Michigan in fifty years, more than the crop that was first taken off, if it is perfectly safe in its protection, the increased value of timber being taken into consideration.

There are some very strange circumstances in connection with the fact that this new crop of timber comes up where the old had been cut off, up in the northern country; for instance, just as likely as not it will grow up thickly with oaks, where pines were before growing. How can that be explained? Is it that the crows have picked these acorns and transported them to those parts? Hardly. You can get a crow to take one once in a while a mile, but they don't come down here and pick and carry enough to seed the hundreds and thousands of acres that are coming up with little oak trees, with no seed growing in the vicinity. That seems to me like a miracle; nevertheless it is true. I have this way of explaining the matter. Those oaks are there. They came up together, but the pines got the start and the oaks got left; but they remained there, and just as soon as the pines were taken away, were cut off, they simply came to the front. We know of little oaks in pine woods, we could actually count with the microscope hundreds of them that have just stayed there. The government don't know they are there. Only competency will find them. I have on my farm a little forest of six acres. I planted one single row of black ash seedlings right next to a row of Austrian pines. They are now about fifteen inches tall. The ash are about twelve inches. The

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ash will soon be crowded out; the pine will continue to grow. I could not understand the oak business until I had actually seen the black ash experiment. These little trees are there, and they are living, and I presume they will continue to live one hundred years, probably; and if my children's children's children should cut off those Austrian pines and give the black ash a fair show, they might have black ash there as the successor to the Austrian pines. Nature is a wonderful recuperator on the earth's surface; the trouble is, man fights against her so strongly that she does not have a fair chance. They have some fine fruit, or would have it, but they will kill the birds that kill the bugs that eat it up. Nature is all right; man is at fault. Man fights nature, that is where the trouble lies; and it is man, after all, that has to come around on God's side, and that is what we are after.

President Hobbs: If there is nothing further, we will take up the next subject, "Education for the Home Maker," by Mrs. Virginia C. Meredith, professor of home economics at the University of Minnesota. Mrs. Meredith needs no introduction to an Indiana audience further than this.

Mrs. Meredith: I am very much inclined to go on with Mr. Freeman's speech. There is quite a good deal more that might be said on that subject. There is a saying that where the trees go, men decay. And I believe if we were asked of all the nations—we will just say Europe—which nation is going backward, where man is least progressive, we would probably say, on the plains of Italy where the forests have been cut away.

I just want to say that I know a man, a member of a firm engaged in supplying railroad ties. He said to me less than a month ago, "Our business is growing; we cut over one hundred thousand acres every year for our railroad tie business." Think of that! Isn't it dreadful? Isn't it awful? One hundred thousand acres, and just one firm! Of course, we have to have railroad ties. But that is not the subject assigned to me. I am going to talk to you this evening about the "Education of the Home Maker."

What is the home, and why should the ones who organize the home be educated? Is there such a thing as a special education for the one who makes the home? What is a home? It is one of the most expensive institutions that we have anywhere. We have been hearing figures about

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all sorts of institutions and people complaining of taxes paid for the support of the government, local, municipal, and State, and all that sort of thing; but there is nothing, no institution so expensive as the home. Of all the dollars earned in the United States today, directly earned, I suppose ninety-nine cents of every dollar goes to the support of the homes. That is the end and aim of all the money earned, to support the home, the most expensive institution we have. What is the home? I say it is a place and an opportunity for the right development of the physical and spiritual natures. That is a broad and conclusive definition. If all men are engaged in an effort to support homes, we ought to demand a great deal of the home. We must demand a great deal of it to justify this extraordinary expense. Now, it would be far easier if we were to live in communities, if we were to live in companies of fifty, one hundred or one thousand, as they do in asylums; that is a cheap way to take care of them —to have but one cook, one person to buy the clothing, one person to buy the furniture, one church, one school. That is the cheap way. As we do not live that way we will have to give our reasons for it. What is there about the home, then, that justifies this immense expenditure of money for its support? There is just one thing, and that is the protection of child life. There is nothing else that can be an excuse sufficient to justify it, on economic grounds.

There are four propositions I wish to make in this connection. The first is the definition that I have already given you of the home. Home is a place and an opportunity for the right development of the physical and spiritual natures. It is the place in which we have fresh water and food, the right kind of clothing and such things as develop in the right way the physical life. In addition to that, it is an opportunity for the spiritual nature to be developed, all of those fine things, those traits that make man what he is. That opportunity for the spiritual development must be a part of the home.

The second is that the organization of the home is primarily and perpetually a personal and independent enterprise. The nature of the home is such that it can never be organized by a syndicate. We have seen syndicates and co-operations in modern life for benevolent purposes, but they can never organize and manage a home. It is a personal enterprise.

The third proposition is, that home making and house keeping can scarcely be separated, and that taken together they form a business as important and in purpose more definite than any other business known to modern times. This home, then, if organized as a business, has certain well defined lines and principles that underlie its successful organization.

The fourth proposition is this: that the one who undertakes to organize a home and maintain it, ought to have a special training for this very

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special personal business; a training as definite as that secured by the physician, as definite as that secured by the railway superintendent as he passes from brakeman through all the positions to railway superintendent.

In undertaking to secure this special education, we are at once met with several difficulties. One is the fact that there are women who dislike housekeeping and home making. It used to be considered a treason to say that; it used to be thought that because she was a woman, she had every quality to make her a splendid housekeeper and mother. That is not true, I am grieved to say. That is one difficulty.

The greatest difficulty we have to contend with is, as I believe, that for which I must use the very strong word, ignorance. Women don't know how to keep house and make homes successful. There are many failures, and it is sometimes because of something they can't find out. Women get discouraged, and they think it is not at all worth while to undertake a special education. A few years ago I was at a great pottery in France, and saw in there a young Frenchman who was sitting at a bench working a treadle with his foot. He had taken a small bit of that beautiful white clay and fashioned it for our entertainment. He did it so easily and so successfully and so skillfully that I felt I could do the very same thing. That bit of plastic clay he would draw out into a beautiful high graceful vase, and then make a globular shape in perfect taste; presently he made a cup, beautiful, thin, delicate as an egg shell, and yet he handled it with perfect ease. He handed it to a girl of our party, and she, without thinking, reached out her gloved hand, and she had scarcely touched that cup until it fell in fragments at our feet. The man looked at her in a knowing way, as if to say: "You have not skill enough to hold the beautiful thing I have created." Now that girl could have been taught to hold that cup; she could have been taught to hold it just as easily as the man who fashioned it. So it is with this beautiful, delicate thing we call home, made up of housekeeping and home making.

We see so many shattered homes, so many homes that have been undertaken in youthful enthusiasm, where the girl had not been trained for it, and the home was shattered; but that girl could have been taught, could have been trained; her mind could have been trained.

Of course, there have been most beautiful homes in the past, most magnificent, in which fine men and fine women have been nurtured, and those homes have been organized and managed by those who have had no special training. Such homes are and have been made; but the women in those homes correspond with those men who, without any advantage in youth, have earned their own way, sent themselves to school, and by their own efforts, energy, ability, genius, have reached congress—circumstances under which we call them "self-made men." Some of the finest men we

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have ever had in the United States have been what we call self-made men —men without education when they started, unable to read and write, perhaps; but who would venture to start his boy today, without giving him some opportunity to learn to read and write. The opportunities offered are so much wider to the one who has some culture, some training. So almost every home might be successfully organized and maintained if the one who makes the home has some special training.

I think of this kind of training in connection with agricultural training, education. You know it has not been very long ago since people smiled when the agricultural college was referred to. There were those who thought we needed no special education for agriculture. It is a proposition that can not be denied, that if agriculture is a business that calls for a first-class brain, this brain must be trained and educated, drawn out and developed; if agriculture is a business that can be done by third, fourth or fifth grade of men, then education, perhaps, is not necessary. So, if housekeeping and home making can be successfully done by third, fourth or fifth class women, of course it is not worthy of a woman with a first-class brain. But we think today that agriculture is worthy of the effort of a first-class brain, and we think that no other career can be as fine as that of home making and housekeeping, for a young woman.

One of the greatest problems that confronts us today is the cost of living. When we speak of money spent in our homes, it covers four lines. We spend money for existence, for comfort, for culture and for philanthropy, and the per cent. for each will depend wholly upon our training, and not wholly upon the size of our income. If we have an income of five hundred dollars, and a family of five, about eighty-five per cent. of that income would be spent for existence. If we have a five thousand dollar income, then the per cent. spent for existence would be cut down to about twenty per cent., perhaps less. Now, is there any plan, can anybody think out a plan by which we shall get every last bit of value for our dollar? Has anybody a plan for a five hundred or one thousand dollar income that will bring to the family the right proportionate part to spend for existence, culture, comfort and philanthropy? If so, where is it? That great question is unsolved today; and no question can be more important. Men spend their lives, they risk everything to earn money, and the only use for the money is the family use.

When we think of all the aids and opportunities men are offered for teaching them how to earn money, which is so necessary, when we think of the technical schools for men, engineering, mining, scientific, business colleges, apprenticeships, and everything to help the men to earn the dollar, and then think of the benighted, stricken preparation of the woman who spends that dollar, it is appalling. The value of the dollar that man

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earns is determined by the intelligence of the woman who spends it. There is a rational and just relation between income and expenditure, and it is right to think of the dollar in this way, to think of investing it with all the sentiment possible.

A dollar will buy beautiful opportunities, opportunities for culture, opportunities for philanthropy, for helping others. Can we find an education that will help toward the use of money, toward the organization, support and maintenance of the home?

This new education is the realization of the old theory of education. We have had to undo an unjust appreciation of the mind. We are emerging from that time when everybody was engaged in a feeling toward the material things talked of so much in life. There was a reaction from that. Now we are having a reaction from academic training; we are going to have, or have had in many places, manual training schools, with academic training.

The first schools, as you know, were to train ministers. They were the only ones for whom it was thought education was necessary; after a while people saw differently, that others needed education. We had the college, then the high school. We seem to have been going down from the top to the bottom all these years, instead of beginning at the bottom and going up, or forward.

When we give an occasional thought to the education of the hand, it seems to me that ought to be combined with an academic training. I think I might illustrate that in a very homely way by referring to the study of physiology. I believe every child that goes through our ordinary schools has some knowledge of, some instructions in physiology. One of the facts, items or bits of knowledge that comes to that child is that the skin is an organ of excretion. He then immediately knows that much about physiology. That is good so far as it goes. But suppose when the child was taught that fact of physiology, there was a teacher who taught that fact in its relation to the home and housekeeping, what would be the result of that one bit of information? What effect would it have upon the mind of the child? What would it determine for us? It would first determine the necessity of a bath. A child getting that kind of information gets the reason why. So he goes further into the facts and he finds that the skin is more active at night than in day time, and that means no man should wear during the night the clothing worn during the day; it means that the room he sleeps in ought to be ventilated better than where he lives during the day time. He spends one-third of his life sleeping. He inquires further, What is sleep? Who knows what sleep is? Those who thought it was physical exercise have begun to think it is spiritual exercise. They used to teach that we had to sleep only for the physical body, in order that

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the physical body might repair the waste of the day, that we might recuperate. If that were true, then the lazy man would not need any sleep, when the fact is that the lazy man sleeps longer than other men. There are many reasons. If you don't sleep, what is the result? Does your body waste away, does it become more tired? No; it is the mind. So sleep is not physical exercise altogether; it is physical exercise, but more. The child has been led to this, and then what comes? If sleep is a spiritual exercise, if the soul is refreshed, ought we not approach sleep in the right way? Not only in the matter of wearing proper clothing, but ought not the mind come in the right attitude? Ought we not get in a pleasant frame of mind and remain in the right way? That bears on family life; that means good temper when you get up in the morning. And in this day, just in this fact of physiology, can you not see that if all of this knowledge a child gets at school were properly connected, shown in its right relation to housekeeping and home making and home life, members of the family, kindness, temper, and all these things, can you not see how much better satisfied we would be with life?

Now, this education embraces several things that are easily taught. One thing, that almost seems to be more important than anything else, is the subject of cookery. I suppose everybody here can cook. Men are the best cooks, because they never cook. But isn't it astonishing how many poor cooks there are, how much poor cooking there is, and how much wasting there is of good material, because the one who is doing the cooking has not mastered the effect of heat upon particular articles that are being cooked. So very much that ought to be palatable, and would be nutritious, is absolutely wasted. If we could be taught simply cookery, wouldn't housekeeping and home making be very much more agreeable to us than it is? I am sure that it would be. The same is true of sewing. It is amazing how much good material is wasted because one does not know how to choose the material, in the first place. Just think, for instance, of differentiation along the line of animal and vegetable fiber. Well, you say, animal is more healthful than vegetable fiber; that will soon take the place of linen as an article of fabric. So we find along the line poor judges of material, who buy shoddy materials because they don't know how to judge them, and they make them up unbecomingly because they don't know how to make them. There is so much in making garments in a becoming style. We all know if we get a little child a dress that is becoming, and make it in a way the child likes, that child will wear that dress and wear it and wear it; but get a dress that is ugly, that it doesn't like, that does not suit, and pretty soon that dress is past wearing. So all along the line. Here comes the benefit of getting this kind of a special education. This is given in many schools, today, very many

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special schools; but only in a very few cases has practical manual training been given in the academy. Why has it not? Because it is expensive, very expensive. So it is not given.

I have a favorite theory, and I cling to it as everyone does to a favorite theory. I believe the right place to give one who is going to keep house a special training is in the agricultural house. I believe in having an equipment that could be utilized along the line of cookery in connection with the vegetable gardens of the horticultural department and equipments already in horticultural colleges. It might be very well utilized by giving girls instructions along this line.

In the school of agriculture in Minnesota, Dr. ———— has a very beautiful little museum made up largely of native birds of Minnesota. Unless you would see it, you would not understand the variety in colors the native birds would illustrate. He uses these birds in his class room in his own particular department, but also this museum of birds is used by the teacher of sewing in training girls along the proper combination of colors. There is nothing finer in the way of combination of colors than the plumage of birds.

Now, along other lines, in plant life, the girl can pursue as well as the boy. The girl can study that and receive as much benefit from it as the boy. It is a fine study in itself.

I am one of those who believe that the finest and best home is made on the farm. I believe that people go away from the farm because the women are not satisfied. I believe the women are not satisfied because they don't understand the business of farming. If they could take an agricultural education along with the boy, their eyes would be opened a great deal. When we come to study live stock, I think we come to have more patience with everything about us. In the school of agriculture in Minnesota, the girls have the same instructions as the boys in the elementary classes of forestry. The one point is that they may be sympathetic. When talking about forestry, its effect upon the climate, and industries, and in a sociological way, these women are more sympathetic toward the movement than are the men. In Minnesota congress set aside an immense tract of forest land, two hundred thousand acres, as a national park, and it was the women who originated the movement that resulted in the action. We find that in cities, the women are already taking steps toward originating these.

I think that education at the agricultural colleges should be extended to the girls as well as to the boys, along the lines of plant life and animal life, and when the boys get their manual training in their special work, let the women take cookery, laundry, etc.

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I thought there was a very good exercise in home economy in a certain class talk not long ago. They had the lectures in the line of expenditures, and the examination consisted of an expense account of one family for one year in a certain named income. To show you how the class was progressing, I will tell you about one girl. She started with a family of five, and she was going to spend one thousand dollars on that family of five. She thought it was a lot of money when she started, but when she got about five months along she found the money was not going to hold out throughout the year, so she concluded that one boy should get drowned and they could not find his body, so there would be no funeral expenses to pay. However, they do not all do that way.

I suppose that the bread in South Bend today is baked by the men. I suppose it is; it is in other places. Why should they not do it? The laundries are run by men, the sewing of men's coats and trousers is done by men, and why should it not be? All of these things we used to think belonged to women, and being really women's work. Many kinds of work has been taken away from the women. To me, it does not make any difference at all whether he makes the bread or the coat, or whether she makes it. The thing we are concerned in is that the bread shall be good and the coat well made. If the woman can do it better, let her do it; if the man can do it better, let him do it. Above and beyond sex is ability in certain lines of development of the individual, and that is what we are getting at.

Aside from every other business which women do, or which they fail to do, there is certainly on the part of women an aptitude for home making, which I don't think is to be taken away from them.

So we see two kinds of economics, masculine economics, which uses men toward the end of creating great wealth, and feminine economics, which uses wealth toward the end of creating great men. Man earns the dollar; woman spends the dollar judiciously, wisely, and gives opportunity to her family.

I believe it is possible to educate women specifically and definitely for home making and housekeeping, and I believe it should be given, and ought to be given in our schools of agriculture. It is a movement toward elevating the home, and preparing for it as a career is a reaction, I think, from the disposition which women have had to leave home and go into commercial life. They have been driven into commercial life, but it is their province to make a home. This is half of her education. College women have been thinking along these lines; schools are being organized, and home making and house keeping is being held up as a definite business which must be prepared for, if they would be conducted very successfully.

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I suppose all of you were at the Columbian Exposition. Some of you may have read those inscriptions that were written by President Eliot from Harvard. The inscription was over a fine monument, and the inscription was almost greater than the monument, which was among those at the peristyle looking out toward Lake Michigan: "To the brave women who meet strange dangers—reared families and made homes." Wasn't that a fine recognition of women? With those pioneer women, in those new homes, the home was never made without heavy toil, and they met strange dangers. Dedication of life, knowledge, intelligence, everything, is worthily dedicated when it is dedicated to the home.

I think of home, often, as of the making of a violin. Those who have read Kate ————'s story will remember how she says the wood is taken from a tree on the sunniest side, just so near the heart of the tree. It is then put in a stream of running water, and there hears the rippling of the water, the singing of the birds and the sweet sounds of nature, and then the bit of wood is taken from the water and put away twenty years, fifty years, one hundred years, and then some one comes and takes that bit of wood and fashions it into a violin, and when it is made, this perfect instrument, it takes another to get from it the sound that sends your own heart to all those beautiful memories, those beautiful thoughts, beautiful treasures of inheritance we have from our mothers that used that first violin, but our own hand must bring the chord, and our hand and heart both must be trained.

President Hobbs: I am very sorry that this house was not filled to hear this splendid address.

Professor Latta: It seems to me it would be a nice thing to give the ladies present an opportunity to express themselves in regard to this kind of education. Indiana women do not know very much about it yet; at least, so far as I know, they are not seeking it to a very large extent.

Mr. Garfield: Several years ago, perhaps ten, Mrs. Mayo, who is the best woman worker in the grange in our State, appeared before the Board of Agriculture and made an appeal for the farm girls, asking that the Board of Agriculture recognize the responsibility as great in connection with the girls of the farm as the boys of the farm, and promised that if the board would make public recognition of that fact that she would do her best in connection with our large rural organization to furnish the raw material. The Board of Agriculture, after discussing it up and down, to and fro, got the farmers interested in taking testimony in other States

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where co-education along rural lines had been established, decided upon the establishment of a women's course. Mrs. Mayo and her associates did their part well. At the outset there was a goodly number of girls started in at the college to take the woman's course. After two years the State Legislature recognized the importance of this department in the agricultural department to this extent that it appropriated for the finest building on the campus, so that in Michigan the education of the girls at the agricultural college is perfectly co-ordinate with the education of the boys, and those things best adapted to the needs of the girls in growing to be home-makers will be won in time. It is not perfect now, but we hope by-and-by to incorporate some of the very delightful things into it, which Mrs. Meredith suggested as generic. I was so glad to have her start out with the principle that it was the expenditure of money that was particularly woman's work in the world, the expenditure of money in connection with the building of home. Now it seems to me that that must be kept to the front in connection with the agricultural college. It is not simply the acquirement of scientific education, of knowledge simply of things, but knowledge of how to accomplish certain things with this factor, money, in hand.

We are making mistakes over in Michigan. Mistakes are always made in connection with new things of that kind, because it is an untrodden field, but we are gaining a great deal on it, and we have great hopes for the future.

We copied from Indiana years ago, when we put in a mechanical course in an agricultural college in Michigan, and it has been a success; and while I would not ask Indiana to copy from us, yet you can do as we did, make a venture in that line.

Professor Webster: I really do not know what is to be done in the agricultural college in that direction; I can not tell you and I do not know why Professor Latta asked me to tell you. I have no personal knowledge of the exact course that they are pursuing, but I hope that they are taking precisely the same course that Mrs. Meredith has suggested.

Professor Newton: While I agree with the advancement that is being made in the agricultural colleges, yet I would like to have it broaden out a little. Mrs. Meredith is simply giving the girls a

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hope of a chance, that is, we who are able to send to college. I believe this matter ought to be taught in the public schools, in the rural schools, to a certain degree. That is one thing that is being neglected. The rural schools are not what they should be, and I believe we should have help in that line, although the matter, as it is being worked up in the colleges, is a great thing; but those who are not able to go to college are left somewhat in the dark.

Mr. Fess: Some years ago, not very long ago, my wife became acquainted with a couple of young ladies in Grand Rapids who had some special training along the line that Mrs. Meredith has indicated, from Philadelphia. She invited them to come out to our place and give us a talk on cooking. They consented to come out, and there was a gathering of ladies of the neighborhood to listen to them, and they talked along the line of the preparing of certain special dishes, and on bread-making. Of course, we thought that everybody knew everything about bread-making that was necessary, and it was generally supposed that you ought to keep bread standing about as long as you could to make it good. They said this was a mistake, that you ought to get the bread out of the way as quickly as possible, to take plenty of yeast and hurry up your bread-making. Well, this was only one thing; they learned that afternoon a great many things; and not long ago I heard one of those ladies say that she was certain that the little education they got from those trained cooks was worth more than a thousand dollars to the women of that neighborhood. This is the way it worked up an interest in them; they didn't stop at just what they learned that afternoon, but it set the ball a-rolling toward advancing things in many ways, and I have been surprised to see the advance made. To me it is a lamentable thing today that so many young ladies commence housekeeping that haven't any more education along that line than a last year's bird's nest.

Mrs. Robertson: I have this to say, that if our girls are to be home-makers, this is just the sort of an education they ought to have, just the kind of an education we ought to give them, and I can think of no other or better place than in the agricultural colleges. I have given the subject no previous thought, whatever, before coming here, and so have nothing more to say at this time.

Lady Member: We certainly want that kind of an education for the girls. I have no girls, but I am interested in that kind of an

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education for girls, because I have four sons who will want wives after a while. (Laughter and applause.)

Professor Latta: It would please me to have more of the women say, "I want my daughter to have that kind of training." We have got to have the second specimen in Indiana, for that kind of training. The first expression has come to us within a few days in the person of a young lady from another county who proposes to enter the agricultural course at Purdue this coming September. We would like to have several others to enter that course this fall. Do you know of anything better for a young lady than what Mrs. Meredith has suggested this evening? Isn't it a good thing for the country to have young ladies trained in that respect? Do you know what is being done in the State of Washington, in the State of Michigan, in the State of Ohio, in the State of Illinois, in the State of Kansas, in the State of Iowa, in South Dakota and away up as far away as Washington, and in other places, in the line of such education in connection with agricultural colleges? Do you know that your own State is away behind, is away at the rear of the procession in that respect? Some ladies would say, what is the matter with your Purdue? The facilities are equal there. Purdue has been struggling along pitifully during years gone by. There has been a demand for expenditure of two dollars for every dollar of money, when we have only one dollar to expend; consequently when the boys, the farmer boys who have come there demanding this and the other, giving emphasis to that demand by their presence, we have been compelled to do this and that and the other in the line that they desired done; we have done the best we could for them, and said, "If you will come, we will see that your wants are supplied, as best we can." I believe with all my heart and soul in this kind of education, and I heartily thank Mrs. Meredith for those words. It must come sometime in the future; when, I don't know, but I do believe that we shall solve in a large measure the problem of education for the boy and girl of the farm who expect to spend their lives on the farm. If the girl is trained so that the home is an ideal place for him, the home will be happy and both will be contented. If the girl is looking elsewhere, the boy will look elsewhere, too. People will tell you there are not many who can get this kind of an education at college; but do you know that there are thousands of young women in Indiana at college taking

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other kinds of training, training not in this line at all, because this kind of training is not being given. Do you believe the women of Indiana ought to have it in Indiana as well as in Michigan? They have over one hundred in Michigan, and have only been at work about three years. What does that mean? What will be the future of our farm homes if our daughters are looking elsewhere and our sons are looking elsewhere? What are our future homes in Indiana? It is a question I feel too strongly upon to speak as I would like to in this spontaneous way. Don't go home with the impression that we are fishing for some inkling of a demand in this line. We propose to take this one girl, even though there are no others who come there for that purpose, and do what we can for her, in the hope that she may inspire other girls to come and do likewise. It is a good thing.

Professor Goff: There are some things we are getting a little jealous of; this matter of woman's education, we are getting a little jealous of. I will say we have not settled on this question. We have had a few young women at our agricultural college. Last winter our Legislature passed a bill authorizing the founding in counties of schools of agriculture and schools of domestic economy. That will meet the point, the question this gentleman spoke of, that there are so many who can not attend the agricultural college; but there will be a good many in each county who will be able to attend these schools of domestic economy.

Member: Regarding the subject of forestry, there is a law in this State providing for the reservation of lands for forests, which lands are exempt from taxation, as I understand. I would ask some one who knows, if they will, to explain more fully what that law is.

Professor Freeman: There is a law on that subject. There is but one law in this State now, directly upon that subject, which is the reservation act of 1899. The law is simply this: That any land-holder has the right to set aside one-eighth of his entire tract of land as a forest, under three conditions:

First. If it is a natural forest, containing 170 trees to an acre, he can go to the auditor and file a claim, with a description of the land which he desired to reserve. This is subscribed under oath, and this claim must state the number of trees required by the act, and that he intends to maintain the same according to the in-

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tent of the enactment; and upon his doing this, this original forest becomes subject to this act upon his filing with the auditor the description as I have stated.

Second. If he wishes to set apart his land, one-eighth, whether it be forest or not, he can plant one-eighth of his farm in trees, 170 to an acre, and cultivate them for three years, and then it will become subject to the act, as I before stated.

Third. If it contains one hundred trees or more, he can plant enough to make up the required 170, and cultivate it for three years, and then it becomes subject to the act, as in the other cases. But in either case, he can not pasture this land until there are 170 trees above four inches in diameter. That is, under this law, all that the farmer has to do, if he has the forest on his farm, or plants the trees as I have described, is to go to the auditor and file an expression of his willingness to set aside or reserve as a permanent forest, not to exceed one-eighth of his land, and specifically and definitely describe the land, and this is made under oath. Then the land is assessed at one dollar an acre, which practically means that it is exempt from taxation.

Member: There has been some trouble about that law, has there not, in some of the counties? I have heard something about the trouble. Can you explain that matter to us, what that trouble was about?

Professor Freeman: There was some trouble in Jay county that resulted in nearly bringing the matter into the Supreme Court; but that resulted from the fact that when the law came out a great many persons who had the power of notary public got in their buggies and drove all over the country and solicited farmers to make these exemptions. Out of forty-three every one was wrong, and that is why the auditor would not file them. As soon as they were made out correctly the auditor filed them. You can file the claim at any time throughout the year, and the auditor will keep the record of this, and the assessor in the spring will examine the various forests and report favorably or unfavorably. If favorably, the auditor will make the reduction; if not, he will refuse to make the reduction. If the man has 160 acres, he can set aside 20 acres.

The meeting here adjourned until 9:00 a. m., Friday, August 23d.

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MORNING SESSION.

Friday, August 23, 9:00 A. M.

President Hobbs: We will open the exercises this morning by music.

Piano solo by Mrs. Ort.

President Hobbs: We will now be led in prayer by Rev. E. P. Bennett.

Prayer by Mr. Bennett.

President Hobbs: We will now have a solo by Mr. Matthews.

Vocal solo by Mr. Matthews.

President Hobbs: The first topic for discussion this morning is "Our Native Plum," by Prof. E. S. Goff, Horticulturist at the Wisconsin Experiment Station. I regard Mr. Goff as the foremost authority at this time as to the native plum; I think he has had more experience, he has done more with them, and knows more about them, probably, than any other person in the country.

Professor Goff: Mr. President, Ladies and Gentlemen—Before beginning my lecture, I wish you to all understand what is meant by the native plums. It may be known to some of us, and many of us, that there are several different species of the cultivated plums. We all know that there are different varieties. We are all, perhaps, familiar with the Lombard plum, the Green Gage plum, etc.; but some of us may not know that there are several other distinct families of plums. There is the blue plum that you so often see in the market, large blue plums, and the old green gage plums we all knew in our childhood, belong to the class that we know as the European plums. That means they were brought to this country from Europe by our ancestors. These are more extensively grown than any others in this country. They are successfully grown through the middle section of the country from north to south; they are fairly successful as far north as the Great Lakes. Then we have another class of plums that have been recently introduced from Japan, the large Burbank, etc. They are quite different in their properties from the European plum. We don't

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generally consider them as delicate in quality. They are about equal to the European plums in hardiness, probably not quite so hardy.

We have, in addition to this, the wild goose plum of this country, found here, native plums, and are here to a lesser or greater extent in the wild parts of the country. These plums were not until a recent date considered sufficiently valuable for cultivation. These are also two distinct types of the native plums. The wild goose plum is a familiar type. The wild goose plum is of the same family that we notice in the central and southern portions of our country. In the northern part of the country, I have still another species. I wish to have you distinctly understand the difference between the wild goose class of plums (I speak of it as a class, although there is distinguished two or three different species of those) and what we call the American or northern plum. It is of these species that I shall speak largely today.

THE CULTURE OF NATIVE PLUMS.

BY E. S. GOFF.

[Abstract.]

In a climate as far north as this, the European and Japanese plums are not reliable for fruiting. It is true that after a mild winter, the trees may fruit well, but in a winter when the temperature descends much below twenty degrees below zero, the flower buds of these species are usually destroyed.

In Wisconsin, we have been obliged to abandon to a great extent the European and Japanese plums for market. We have, therefore, turned our attention to the native plums, and I am pleased to say that we have found one species of native plum that is proving very satisfactory. The flower-buds are not susceptible to cold and the trees are long-lived and productive. This is the species that is designated by botanists as Prunus Americana, of which we now have something more than a hundred named varieties.

The speaker here showed samples in bottles of some of the finest varieties of this species of plums.

As you will observe, the fruits compare favorably in size with those of the European plum. This species is native all through the northern States, and far northward into Manitoba. It has been reported that the

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summer after the severe freeze of February, 1899, trees of this species of plum that had been exposed to a temperature of fifty degrees below zero bore a fair crop of fruit. At our Experiment Station we have not failed to secure a crop of this species of plum since 1894—the first year in which we had many trees of it old enough to bear.

It should not, however, be understood that this plum can be grown without careful treatment. The curculio is nearly as injurious in this species as in the European or Japanese plums. We use the jarring process. It is important, also, to cultivate and fertilize the land well. Mulching may be used as a substitute for cultivation where the trees are closely planted. It is also important to thin the fruit in many varieties. Varieties should be freely mixed in planting, as it is now well established that the flowers are not fertile to their own pollen.

The Americana plums are chiefly used for culinary purposes, but they sell well. We have not yet grown enough of them to test the capacity of our local markets. The past two seasons we have received as much for our plums as good Michigan peaches sold for in our market. The quantity of these plums that may be sold is large. Many families order a bushel, and we have sold as much as six bushels to one party for hotel use. The native plums are rapidly becoming staple fruits in the markets of the northwest.

Member: I would like to know if you succeeded in growing a great many plums that were worthless? If you did so, what did you do with them? Did you use the stalks for grafting, or did you destroy them entirely?

Professor Goff: We did, of course. We are extensively engaged in growing seedlings from the best of those native plums. Of course, if the seedlings were not fit to use for any purpose we need them for, we throw them away. Sometimes we top-graft them, but we generally throw them away.

Mr. Kingsbury: I did not understand you to say what the proper distance was to plant them apart?

Professor Goff: We have recently planted an experimental orchard for commercial purposes; but we are growing them as an experiment. We planted them twelve feet apart, with the expectation of taking them out, one-half of them, after beginning to crowd. After thinking the matter over carefully, we thought that was the wise thing to do, because I do not want to crop the ground between the plum trees; but having planted them twenty-four feet

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apart it will be several years before they occupy that ground. We concluded, judging from the experience of the experimenting orchards, that the intermediate rows of plums, up to the time that the trees began to crowd, would pay for the expense of the whole cultivation of the plantation up to that time. For full-grown trees, I would recommend twenty-four feet apart; but if any of you like to take out the plum tree after it has got to bearing size, then I would recommend the planting of them twelve feet apart both ways with the idea of taking out the intermediate rows, after they begin to crowd.

Professor Latta: Will you please tell us whether you would recommend under any circumstances, the close planting and mulching of them, instead of regular cultivation? Would that give good results?

Professor Goff: I should say in regard to close planting, that those trees are now interlocking so much that it is difficult to get through the orchard, unless you stoop down and go under the limbs. We had a considerable number of European and Japanese plums in the orchard, and the cold winters have taken them out, so we can get through there better; but if they had been all American, it would have been very difficult to get through the orchard at any place.

Professor Latta: Would cultivation in the regular method be preferable to mulching and planting close?

Professor Goff: I think so; but we find we get better results from mulching than cultivation. It is more expensive than cultivation, but it is better than cultivation alone.

Member: What would you recommend for a crop for the first few years, in a plum orchard?

Professor Goff: I would not recommend anything. I would prefer very much, indeed, to give my ground up to the trees, exclusively.

Member: How about chickens?

Professor Goff: Chickens are all right; for a plum orchard, there is nothing better than chickens.

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Professor Webster: Is it better to have the ground bare or to have it covered?

Professor Goff: The better plan is to keep the ground bare during the early part of the season, and then sow a cover crop later. The object of a cover crop in plums is to keep the ground from washing.

Professor Webster: What do you use for a cover crop?

Professor Goff: We use oats. We don't use rye, because it sprouts too much in the spring.

Professor Webster: Which do you regard the best?

Professor Goff: Oats is the best all around. We tried vetch, but the principal difficulty is that the seed cost about six dollars a bushel, and it makes it pretty expensive.

Member: In your planting, do you give any attention to pollination in planting?

Professor Goff: We endeavor, so far as may be, to plant together those that bloom at the same time. It has been well established among native plums that they do not fertilize themselves; so in planting we mix them instead of putting them in blocks.

Mr. Johnson: Have you been troubled with black knot?

Professor Goff: We have not been troubled with black knot at all.

Member: How about rot?

Professor Goff: We are troubled some with rot. The rot troubles the European and Japanese plums rather more than the American plums. The only remedy for that is to thin them so they do not touch each other, so no two touch each other, and they are not so bad.

Mr. McMillan: When does the American plum begin to bear?

Professor Goff: They begin to bear at three years from setting, very often.

Professor Troop: I don't know that I can answer that question, but I will say that Mr. Carr of Maryland has grown this class of plums successfully in Maryland. He published a statement that

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the American plums were more profitable to him than the European or the Japanese, because he could get them on the market earlier.

Mrs. Davis: I have been a raiser of plums since 1890, and I have seventeen varieties, mostly European kinds; I have two native varieties, and I have five or six Japanese varieties, and I have not found that the European kinds winter-kill at all; but they sometimes fail to bear a good crop because I don't thin them enough. I live in the northern part of Laporte County, and I had a good crop every year I thinned. I spray instead of jarring. I used to jar, and found it took up too much time; I did not get my breakfast early enough, and I had to do it myself. I spray every winter with soap suds and kerosene for insects. I also spray with Bordeaux mixture after the blossoms fall, three or four times. I came today to learn something about native plums. I have only two varieties. I have grown a few European and native varieties but I have not made a success of it. I have one native variety, the gold plum, and I can not make it bear. I have five trees I set out in 1897. They have blossomed for two or three crops, blossomed full. I tried to get a specimen of this plum to bring with me, but I could not even get a specimen. I would like to ask the gentleman if I would set some other varieties near them, if that would fertilize them and make them bear?

Professor Goff: I think the gold plum should perhaps be set between other trees. We have a few young trees, quite young trees, but they have not had any plums on until this spring. We have but a few of those, but they are growing by the side of or among other varieties.

Mrs. Davis: We cultivate our plums, and they are set sixteen or eighteen feet apart, and we find that it is too close; we have to be trimming them a good deal. Would not mulching harbor insects?

Professor Goff: I do not think that it is any more apt to harbor insects than loose soil.

Mrs. Davis: We have put in our new orchard a few plums and we set these twenty feet each way, and I do not think they will be any too far apart. I do not like the close setting. I would ask if you spray with a prepared mixture for curculio?

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Professor Goff: We do.

Mrs. Davis: You do not use Paris green?

Professor Goff: We use Paris green for the last spraying. Paris green in an effective agent in spraying for curculio. I think Professor ——— of Illinois, in his experiments, decided that he could reduce the number of curculio by spraying with Bordeaux mixture and Paris green.

Mr. Swaim: I do not want to interrupt the professor's suggestions, while on the plum subject, but I want to give my experience in spraying for curculio with Paris green. I used Paris green early, as soon as the buds started. Whether it was due to climatic conditions, a cold spring, or whether due to the spraying, I don't know: but I do know that I have had but little trouble with curculio this spring, as compared with the year before.

Professor Goff: I think the cold spring had more to do with it than anything else.

President Hobbs: The next topic is "Care of the Peach Orchard," by Prof. S. H. Fulton, Superintendent of the Fruit-Testing Sub-Station, South Haven, Michigan.

Professor Fulton spoke as follows:

Mr. President, Ladies and Gentlemen—There is no kind of fruit which responds more readily to good care than does the peach, and there is no kind of fruit for which good care is more absolutely necessary than the peach. Where the peach orchard is not given good care from the first, it becomes more a source of annoyance than a matter of profit. A new orchard should be thoroughly cultivated from the start. Ordinarily the ground can be cropped the first and second years, depending upon the character of the soil. It is customary to crop but once, but on some of the heavier lands, the trees are cropped twice, with such crops as corn, melons, cucumbers, and potatoes, sometimes, but this crop is not so good because the ground has to be disturbed in the fall and sometimes induces some fall growth. Trees should not ordinarily be cropped after the second year. This year we have had plenty of opportunity of knowing the effect of thorough cultivation of all kinds, and more than anything else on the peach orchard. We have had rather a drouth in Michigan, and the dry weather was telling upon the early peaches when I left there nearly a week ago. Some of the growers in the vicinity of South Haven were hauling water and putting it about their peach trees. The early varieties

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were smaller than usual and somewhat of a bitter flavor, due to the fact of ripening in such dry weather. It was quite noticeable where the ground had been thoroughly cultivated, that the trees were standing the drouth much better than where they did not, and the leaves looked better. Orchards which were neglected as to cultivation, the leaves were turning yellow and falling off, and it was almost certain there would not be more than half a crop of peaches on them.

The number of times they should be cultivated depends upon the season and upon the weather. In the spring we usually plow the orchard. Following this we give it a pretty thorough cultivation, until the latter part of July, and sometimes the middle of August. This season the growers are working the trees a little later than usual, because it has been so dry, to hold the moisture as much as possible. Thorough cultivation is usually best. It does not matter much what tool is used, so long as the ground is kept thoroughly worked. There are perhaps two ideas upon the matter of cultivation. Some believe in keeping out every weed; others believe there is a limit to it. If the weeds appear here and there, they do not think it is a matter of great consequence, so long as they keep it moist on top of the ground. I think this is something a grower will have to decide for himself; but this thing is, of course, true, that if we make the greatest profit, we must produce the crop at the least expense.

The matter of pruning is an important one. The first two years of the life of an orchard, we like to head them pretty well, so that the body will become strong in proportion to the size of the top, and have the main branches of the tree become thickened up. We know the tendency of the peach tree is to make long arms with few branches upon them, and when bearing heavily it is likely to break down. Heavy pruning for the first few years would obviate that to some extent. Most growers prefer to cut out the center branches so as to leave the tree open to admit the light. In the south it does not make so much difference, because there is a good deal of sun there. We always practice spring pruning, shortening in of the growth, and thinning out. The lower branches are sometimes cut off from the peach tree. I think this, in most instances, is a mistake. We have quite a good deal of pruning that growers term "cow-tail pruning;" the lower branches are taken off and you have a tuft of leaves upon the upper extremity of the branches, giving the branches the appearance of the term, and the lower part of the branches will be entirely destitute of foliage. This is a mistake. In a short time the trees will become very tall, and it will become quite an item in picking, and it also brings the fruit out on the ends of the branches and they are quite liable to break down.

Low heading should be practiced, where it can be; it is much easier

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to handle the fruit, and it is much easier to spray the trees; and they stand against the high winds much better than otherwise.

Yesterday we had the subject of fertilization of the orchard discussed, so I shall not touch upon that to any great extent today. The matter of fertilizing the orchard is a very important one, especially upon the lighter lands. Professor Huston, have you some formulas for mixing ingredients to use upon the orchards? We have not done much in Michigan, as yet, toward using commercial fertilizers, but we will have to in a short time. At the present time we rely mostly upon stable manure and wood ashes and ground bone. The wood ashes, where they are to be gotten, is one of the best fertilizers we can use, but the supply in Michigan is getting very limited. I think we will soon have to come to some form of potash, or ground bone is always good and the effect is lasting.

Member: Will you tell us the formula the Michigan peach growers use for fertilizer; it is made in what quantities?

Professor Fulton: I could not answer that satisfactory. There are few of our growers who have used commercial fertilizers.

Member: I think Mr. ———— uses wood ashes and phosphates in some form.

Professor Fulton: I am not positive as to the kind of phosphate he uses.

Member: Do you know how often they fertilize, every year or every other year?

Professor Fulton: About every other year, I think; it would depend somewhat upon the crop. Where we use wood ashes and barnyard manure, it depends somewhat upon the crop we get as to how often the trees are fertilized. Where we get a crop every year, we like to fertilize about every other year, and sometimes every year. Ground bone has been used in considerable quantities. We have not used any form of potash, except such as we obtain in wood ashes. Upon our sandy lands, in particular, we find stable manure a good fertilizer, but it is considered objectionable by some, especially to some varieties.

The matter of spraying has been gone over thoroughly, so I will not say very much about that.

The leaf curl, some seasons, is very troublesome; but we find by the application of spraying we are able to control that disease effectually, and sometimes only one spraying is necessary. Some-

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times the disease is very bad and takes the entire crop in some sections, but one spraying is ordinarily all that is necessary. For this spraying we use a copper sulphate solution, one pint to twenty gallons of water, and apply it in the spring before the growth begins. Some have tried winter spraying with quite as good results. We have not had any very bad attacks of leaf curl since we have tried spraying. Last year we sprayed some in November, and we found a little more curl on them in the spring than if we had sprayed in the spring.

Late spraying does not do nearly so much good as it does three or four weeks before the buds begin to open, and at that time there is more time for such work than there is later in the season. Bordeaux mixture has been recommended for early spraying, but the copper sulphate solution is not so much trouble.

As to the cover crops in the peach orchard—what was said by the speaker who preceded me, Professor Goff, about the plum orchard, applies very well to the peach orchard. Oats is one of the best cover crops we have. We have used crimson clover a good deal, but it is difficult to get it to catch; it also kills out; but if you get a good stand in the fall that winters over all right, it will make a good growth in the spring and is a good cover crop.

Professor Latta: Have you tried drilling clover in light soil?

Professor Fulton: We have not tried drilling it. Our plan is to broadcast it and work it in with a spike tooth harrow. We have in some instances drilled oats with crimson clover.

Member: Do you think there is anything in getting soil inoculated with the bacteria, where crimson clover has grown?

Professor Fulton: Yes, I think it might help the case considerable to get some soil upon which clover has been grown and use that for inoculating soil upon which you sow it.

Professor Latta: Have you had some good catches?

Professor Fulton: We have had some fine ones.

Professor Latta: You spoke about its drying out and dying; I think the secret of that is too early sowing, in that case.

Professor Fulton: I should think that might be the trouble; sandy lands are inclined to be somewhat dry anyway. The upper

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two inches of the soil becomes very dry, and there would be a liability that it might dry out, if it is not sown deep enough. Where crimson clover is grown and a good stand obtained, you ought not to wait until it begins to blossom. I know it looks very beautiful, one likes to see it in that condition, and it almost seems too bad not to leave it, but it is fatal to the best results of the orchard that season because it draws upon the moisture which the trees ought to have. I think it pays better to work it under when the plant is small, or as soon as the ground is in good condition to work. Where we sow oats they freeze out during the winter, and there is no trouble from them in the spring, and upon the other hand they answer the purpose all right.

Member: What time would you sow oats?

Professor Fulton: That depends upon the season. Quite a number of growers had sowed their oats when I left a week ago. No doubt, after these rains, they will be busy sowing oats as quick as they can get ready, those who have not already sowed. About the first of August is the usual time.

Professor Latta: What is the average life of the peach orchard, under such care as you have given?

Professor Fulton: With good care and thinning—I think I said nothing about thinning—the length of the life of the tree depends to quite an extent upon thinning of the fruit. Where trees overbear they break down, and all the best growers make a practice of thinning, and where given care such as I have spoken of, they will usually last twelve years, and I know of some orchards sixteen years old which are still fruiting well.

President Hobbs: Last summer I went into Mr. ———— orchard at Benton Harbor, Michigan, and he pointed out to me trees thirteen years old, and they had borne for a number of years, I don't know how many good crops of fruit; and with his system of tillage and fertilization and thinning he had so preserved the vitality of the trees that they were in perfect health, making a fine growth that season and supporting six or eight bushels of fine peaches to a tree, showing the possibilities of the peach tree when properly fed and cared for.

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Mr. McMillan: I wish to ask if we can depend upon securing a good peach by planting seed, or do you depend entirely upon grafting?

Professor Fulton: We depend entirely upon budding. There are two or three I know of indirectly in Michigan, which have given very good results that depend wholly upon seedling trees. Some varieties will produce themselves, or very nearly. Hill's Chili is one of those. There are other varieties which we would be absolutely uncertain as to what we would get. The Smock is another variety that will reproduce itself.

Member: I have been reading something in regard to thinning, and I wish to ask your opinion in regard to it, particularly in regard to one party who thins pretty largely with the shears. He waits until the buds come out in the spring, so he can judge from that about how many peaches the tree would bear, and he, instead of commencing below and doing the cow-tail trimming that has beeen spoken of, commences above and works down out of the tree, and thins out and leaves what he thinks the tree may be able to support; he cuts out the fruit in that way, instead of allowing them to grow as large as your finger. He aims to trim the tree in the spring before they commence this process. Everyone knows the effect of trimming the grape vine, how the grape vine will send out new wood on which to bear the fruit, but we have not got to the idea that the peach will do the same thing. In this way, in cutting it out at that time, the tree is ready to send out a new growth of wood for the next year, so he had an abundance of new wood in time to produce new peaches, and keeps on in that way; it produces better peaches. So his idea is that he will do his thinning with the shears, largely. Mr. Stephens, of Kalamazoo, says, "How long we live before we know anything." I only learned last year to thin my plums with the shears, carrying out the same idea with the plums that Mr. Morrill does with the peach.

Mr. Henry (Laporte, Ind.): Would he take into consideration that he is in northern Indiana and not in Michigan; that he is in a section of the country where the greatest difficulty is to get the peaches on the tree, not to get them off? That is our trouble. If he will explain to us how to raise peaches in northern Indiana, how to get them on the trees, I will see about getting them thinned

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enough. Our difficulty here is to get a crop of peaches once in five years. I would like to know something about that.

Member: I can't answer that.

Professor Fulton: You do not have the influence of the lake that we have in the locality of the lake shore country where I come from. That is what makes our peach trees bear. If we did not have the influence of the lake, we would not get crops any oftener than you say you are able to get them here; I doubt if we would get peaches at all, in any quantities, at least. On the east side of the State we are able to grow some peaches, but they are not as reliable as they are on the other side of the State. In sections where the conditions are not favorable, where there is danger of freezing the buds, or freezing the trees, some advance can be made by the selection of the hardiest varieties. As you get farther north, you will have to pay more attention to that than you do in the lower part of the State. We have three or four kinds we can rely on. They fruited two years ago after the freeze, and they have fruited other years where they have had no chance at all. The Lewis Seedling, strictly a Michigan peach, a white peach, but the quality is good, is one.

Member: I live about eight miles north of Mr. Henry; we are nearer the lake than he, and we get good peaches generally four seasons out of five, in hardy varieties.

Member: We have peach growers here that, I think, ordinarily average about one good crop in five years.

Professor Fulton: The Kalamazoo is another hardy variety, and is as largely planted as any variety we have. It is a yellow free-stone peach, and one of our standard varieties, ripening in September. It is not quite so hardy as the Lewis Seedling, but it is a hardy peach of a good quality. Hill's Chili is another very hardy variety, but the Chili requires rather moist soil, or it will grow very small and inferior.

Member: How about the Fitzgerald?

Professor Fulton: The Fitzgerald is one that we have not had much experience with, and I could not say as to that.

Mr. Swaim: Do you know about whether they bore after the freeze of 1899?

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Professor Fulton: I do not know as to that. The trees must have been very young at that time; if I remember rightly we had no Fitzgerald. Our trees did not bear following the freeze six or eight years ago. The Gold Drop is one of the very hardiest we have; it ripens later than any of those other kinds we have mentioned.

Member: How about the Crawford?

Professor Fulton: The Crawford is one of the very tenderest we have.

Member: The Alexander?

Professor Fulton: Of the Alexander there are very few planted. They come in the market in competition with southern peaches and they are hard to handle; they are tender and they rot so quickly that they are not being planted any more to any extent.

Member: What can you say as to the New Prolific?

Professor Fulton: The New Prolific is not identical with the Kalamazoo, but is very similar to it.

Member: Have you the Crosby?

Professor Fulton: Yes, they fruit very well, but it is not so hardy. It is a pretty good peach, if it is well thinned, but it has an inclination to grow too small.

Member: How about the Elberta?

Professor Huston: The Elberta does fine. It ripens early in September.

Member: How about the Snead?

Professor Huston: The Snead, we do not like. It comes in earlier than the Alexander. It is small, delicate of texture and hard to handle; it might do well for the local market.

Member: The Greenboro?

Professor Fulton: It comes in with the early ————, and is about as tender as the early ————.

Member: How about the Champion?

Professor Fulton: It is a large white peach with a red cheek. It has not fruited very well for us. In the lower States it has

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fruited remarkably well, and where it bears well, with the right kind of handling, it would be first rate. It is a fine peach. With us, however, it has been a rather shy bearer, and it is tender.

President Hobbs: In our locality it is very hardy, and is of a large size.

Mr. Johnson: In regard to the Champion, I want to say that the only objection I have to it is that the trees break down.

Professor Hobbs: That is due to careless thinning.

Member: How about the Cling?

Professor Fulton: As a general thing they are not very much raised. Sometimes we have a call for them, special orders.

Professor Latta: If you can give me from five to seven minutes without infringing on another's time, I would like to say a few words. You know that in my work I shall be going out over the State more this winter than heretofore. As I have gone over the State I have been impressed with this fact—I may be wrong—but that is why I ask the question—that our orchards, especially on the farms, are not considered as a commercial enterprise, and are neglected shamefully. The average farm orchard, to me, is most unsightly. It makes me heartsick to see the old orchards struggling along against what I believe is not only neglect but abuse. There are men here from other counties, and we want them to go out as so many packages of yeast, to leaven them up again.

I want to ask this question: Am I right or wrong? Is it true that we do not pay enough attention to the feeding of the trees of the orchard as well as care in the way of cultivation? Is that the experience of the people here? Those that are in the business commercially, please answer, for I do not want to preach the wrong gospel. I want the verdict here in the way of a vote, or something. Is it as important to feed the orchard as to cultivate it?

Professor Newton: In northern Indiana I know of but a very few orchards that have been cared for properly; I know of some that have been partially cared for, and I think they have paid for the care. There are very few who are interested enough to take care of the orchard as it should be, in this locality. There are very few fruit growers here who are growing all varieties of fruit. So

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far as I am concerned, I have plums and peaches, and I have neglected, and I knew I was neglecting my apples. My main crop is strawberries, and while gathering and taking care of my strawberries, I have neglected the tree fruit. This year I have a very good crop of peaches, neglected as they were. I deem it possible to grow peaches in this locality, nearly every season, if planted in the right location and properly cared for. I do not believe that the plum is apt to be frozen here. I have raised plums the coldest winters we have had. If the vitality of the tree is kept up, and the insects kept off, I believe it is possible.

Mr. Haines: My experience in that regard and Brother Newton's are entirely different. I have only eight acres all together, and I have it all set out in fruit, and I have lived in my peach orchard most all summer. I have apples and peaches and plums of all kinds. I commenced cultivation in April, and I have been over my orchard twenty-one times since the first of April; I have kept it thoroughly clean, and the trees have had plenty of moisture all summer. I visited another farm over here. My peach trees are only two years old. I think I have ninety-five trees that are bearing peaches this year. I have averaged about sixty-five cents a tree, and some went as high as $1.50. My friend has a peach orchard two years older than mine. He took the plan of cutting all the lower limbs off the trees, making the top about four feet from the ground; and those trees two years older than mine, several hundred of them, when I was through his orchard I found but a few trees with any peaches on. I would like to ask the gentleman in regard to pruning. I have left the lower limbs on, the limbs almost touch the ground, and I do not find the peaches in the top of the trees but on the lower limbs, and I would like to ask him the question in regard to pruning and cutting the tops. They are two years old, and I think the tops are too heavy. The question is, how shall they be thinned?

Professor Huston: It is always well to avoid taking off the large branches, but it sometimes becomes necessary.

Mr. Haines: What time of the year?

Professor Fulton: The spring is the best time, before the growth starts in the spring. If it becomes necessary to take out

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the large branches, do so, and open them up as much as is necessary. Of course, if they are very thick, it may be well to not open them very much the first year, and the next year open them some more, cut and shape it. In my young trees, in the spring, I take a big scoop full of ashes, strong ashes, and scatter under the tree, and as soon as I get the ashes scattered, I cultivate them.

Mr. Swaim: In the past two years I have been about over the majority of the counties in northern Indiana, and my observation is that there is a very small per cent. of the orchards that are properly cared for, or anything near it; the great majority of them are sadly neglected, have had no care, or worse still, have been abused by turning stock in and allowing the stock to do the pruning and thinning. I would like to hear what Professor Troop has to say in regard to that.

Professor Troop: I have been over the State somewhat, and my experience has been a good deal along the line that Mr. Swaim speaks of. I might say that Mr. Swaim has reported to me several times in regard to the condition in which he finds orchards in the State, and that every time he, and others have also, mentioned the fact that where the orchards have been cared for, have been properly fed and cultivated and pruned, that they were bearing good crops, not only this year, but for years past.

Here the question was put to vote, and it was unanimously carried that not enough attention is paid to the feeding of the trees, as well as cultivating and pruning them.

President Hobbs: We will now pass to the next topic, which is "The San Jose Scale and Its Treatment," by Prof. F. M. Webster, Entomologist of the Ohio Experiment Station at Wooster, Ohio.

Professor Webster said:

Mr. President, Ladies and Gentlemen:—This is a scaly subject, and possibly that may account for my saying so much regarding its extermination. Now, I want to confine myself strictly to the topic as placed on your program. The treatment and the details of the treatment I wish to go over until afternoon. I will tell you what we are doing and what we have done, but so far as the details of the spraying are concerned, I should like to have that go over until afternoon, when I can give it more time.

In the first place, I would say that no insect, no one insect has ever been accorded such an unwelcome reception on the face of the earth. It

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is disowned by every country on the face of the earth. Just as soon as we get hold of a fact that points to any particular part of the world as its nativity, immediately that nation or country rises up and disowns it. It is the most difficult one we have ever had to deal with.

Now, in describing this, I hope you will pardon me in conveying to you what this looks like, if I use a rather commonplace illustration. Now, I do not mean to say that there are flies on Indiana; there are no flies on Indiana, I know that; but I trust you will understand what I mean when I say this insect on a tree looks a great deal like a fly speck. Now, you will know just exactly, those who do not already know what it is, what to look for. It is a commonplace expression, as I said before, but it is the best illustration I can give you. If they are overabundant they crowd one another, and they overlay one another. In order that you may know just to the extent that they will do that, I have brought some of them with me. I will ask this gentleman to pass them to you. I don't think you will want to keep them, but you can see just exactly by these specimens, what a tree would look like that was inhabited by those little insects.

In this bottle are three plums, picked from an infested tree, and by this you can see exactly what the appearance of the fruit is from a badly infested tree.

Now, in order to make it a little clearer to you, I have had these illustrations made, exaggerated in size, but true so far as form and color are concerned, as nearly as we can get at it in this way. You will notice upon those twigs, and you will notice upon the trees in the orchard, something that is round like a plate and slightly elevated toward the center, and in the top there is a depression, and at that point there is a nipple-shaped form. It looks like, as my boy explained, a volcano. If you will raise that up with the point of a knife, underneath you will find an object, shaped precisely like that, yellow in color, which is the insect itself. This covering is as much of a protection as is the shell of the turtle to the turtle itself. Now, this is the kind of an insect we are trying to deal with. It is very minute and insignificant in appearance, and that is one of the difficulties; it looks so small, so insignificant, so incapable of doing damage, that people can't understand that it can cause so much trouble, and wonder that there should be so much said about it.

Most insects reproduce by eggs. This one does not. The new are produced by birth. When they first make their appearance they are of this shape and color (indicating on illustration). You will see some of them, if you look closely, and you will see the little tiny yellow ones on the twigs. They look like minute particles of dust, and you must look very closely to see that they move at all. They move about for perhaps forty-eight

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hours, then they will run about over the parts of the tree, or they may fasten themselves to insects that frequent the trees, and get upon the feet of birds, or they may be brushed off on your horse with which you cultivate your orchards, or they may be brushed off on the clothing of those who examine the trees.

Lest I should forget it, I want to say now that our inspector forces are never allowed to go from one orchard to another, where there is any danger of carrying insects in that way. We never go directly from one orchard that is infected to another one where there is a possibility of its being infected.

After this time, that is, about forty-eight hours, they settle down on a twig or a fruit, and it is of somewhat this appearance (indicating). They lose their legs and attach themselves by these filaments. Then, when they get to the stage where they become fastened to the bark, they lose all the appendages of locomotion whatever, and retain only the tube whereby they suck the sap. They live upon the sap of the tree. Then they have this appearance (indicating) still of a yellow color, but covered with the young scale. This is what you would be looking at, directly down on it; and if you could get a side view, you would see something like this (indicating) elevated, with the little nipple-like appendage in the center. It is yellow at first, and the color later becomes black, and still later takes on a grayish color.

So far I have been talking to you about one sex, the female. The male is somewhat different. At first it comes from birth, going through these changes, and then developing into a fully grown insect which has wings. The female has no wings, it can not move. The male flies about, anywhere at will.

So much for the appearance of the insect itself. I think with what you have before you, what you see here and what I have been able to tell you, you can form something of an idea of what to look for in your orchards, because I want to tell you it is one of the things that will bear watching, and not only one year, but every year. I do not know why it is, and we can not understand it, that some of the most careful fruit growers we have, men who stand well up in their profession, many of those fruit growers have overlooked this, year after year; they do not intend to do it, but they do; and not only one time has it been done, but again and again. The insect sucks the sap from the tree until the tree will simply stop growing and die. By that time you have a tree looking very much as those darker twigs in those tubes; that is as near as I can describe it. If you would cover that with mucilage, and then dust it with ashes, you would then have a very good idea of the appearance of a tree that has died from the scale in an orchard.

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Now, as to the way this disease is spread: Of course, you know that in going from one state to another, this has come about largely by way of nursery stock, but it is diffused through the orchard or through a community in several ways. The question comes up very often in regard to infested fruit. You have there a specimen of infested fruit in that little vial. A great deal has been said about the danger from that fruit. We have never been able to trace an introduction back to infested fruit. We tried some experiments last year in this way to see what we could do. I don't want you to take them as conclusive, but I will tell you what we did and the results. Early last October we took very badly infested apples, pears and plums and we placed them directly about the trunks of fruit trees, putting the infested fruit on the ground and heaping them up a little—not exactly heaping them up, but putting them directly about the trees. In other cases we took peelings of apples and pears and twined them around the trunks of trees. We thought what we got out of that ought to mean something, but up to the present time—it is now nearly a year—we have not found a single scale on one of those trees. I do not want to be understood as saying that infestation can not come from infested fruit, but I want to show how difficult it would be for us to do that.

President Hobbs: Why is that so difficult?

There are a great many things I do not know, and that is one of them; but I do know we did not succeed in that case. And I do know this, that it spreads in various ways. We wanted to study this scale in the insectary on trees we had planted there, and we wanted to get just exactly those conditions, and we had a collection of limbs badly infected with the scale brought to us, and we fastened them onto those trees with a wire, and I worked for two years before I could get those scales introduced in that way. I do not know why. We are terribly bungling with some things and other things work very easily. You will understand there was no wind there whatever and they must simply crawl from the limb of the tree to the tree, which they did not want to do. They would fasten down to the drying up bark of the section that had been introduced, before they would crawl off on the tree. We did finally get them introduced in that way.

Now as to the way this is introduced into orchards and the way it is carried over the country: When one of my inspectors (we have ten or fifteen of them) finds a little of this scale on a tree, he knows then, just as well as if he had seen it, that there is an infested orchard somewhere in the neighborhood. The work is dropped right there and he goes hunting for the place it came from. The first thing we do on going to an old

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orchard is to look under old birds' nests, and I will explain why we do it a little later. If one complaining of this insect in his orchard will tell me what side of the orchard his infested tree is on, I can tell him pretty nearly what the result will be. It makes all the difference in the world on which side of the orchard it is introduced or makes its appearance. If it is on the north side at the outer edge, or on the east side, it will spread comparatively slow. I am now speaking of Indiana, Ohio and Illinois; that is, the section between the Mississippi river and the Alleghany mountains. If he finds it on the south side of the orchard, or the west side of the orchard, then he had better look out; they will be carried by the wind in just precisely the same way that the wind will carry a prairie fire. It is just as true in this case as it is of the fire, and it will carry it over a large orchard in precisely the same shape; if you know the shape it will take, then you know what the condition is in regard to this insect.

The Osage hedge is the worst thing we have to deal with. The birds nest in the hedge and feed in the orchards, and they will carry it on their feet to the orchards, and they will bring it from the orchards to the hedge; they will go about in an infested orchard and bring the insects back on them to their nests, and they will carry them from their nests out in the same way, and in that way it is spread.

We find the winds have very much to do with spreading it. For instance, a peach orchard is planted upon the side of a hill. We have sometimes found that this got started at the foot of the hill in a gully. Now, the current of air that passes up through that gully will carry the scale and we will trace it out that way. If we find at the foot of the hill the surface is practically level, it will spread less rapidly, showing that the winds have much to do with it.

I would say that we have occasionally found trees with one or two limbs badly infested with this scale, and no more trees in the orchard infested. Perhaps upon investigation we would find that one mile or a mile and a half or two miles from it was an infested orchard, and the way we explain that is that a bird has come from the infested orchard and alighted on this limb and carried on its feet those insects. We have a good illustration of that over here near the mouth of the Maumee river. There is a large peach orchard with several infested trees scattered through it, and there is no other way for that to happen than by the birds carrying it, coming across the bay at the mouth of the Maumee river. There is plenty of scale on the other side.

Perhaps I ought to explain to you a little more in detail how it comes we get so much information in regard to this insect. Two years ago the legislature gave us fifteen thousand dollars to use in stamping out the scale where we could find that it was established, and we have had no trouble

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whatever in finding out where it was established. I have found that a single report on cities like Cincinnati, Cleveland or Toledo means four or five months' work for twelve or fifteen inspectors. But we have had these men working in them for considerably over a year, not quite two years, in going through this territory and inspecting it. It means not only an orchard, but it means square miles. I presume the men have been over territory including not less than one hundred square miles, locating it, marking the trees. A tree, where the expense of treating it is more than the tree is worth, is marked with a white cross. When treatment is recommended it is marked with a straight white mark. Now, when this is done, a plat is made of the orchard, showing just the location of the trees, and there are two copies of that; one is deposited at the office and the other is placed in the hands of the assistant in charge of the treating. After the inspector has finished, the owner is notified of the condition of his premises and ordered to treat it within a certain time. If he does this, well and good; if he does not, or will not, then the assistant in charge of the treatment, with a bundle of those copies, of those maps of cases in that locality, carries out the system of treatment and the owner of the premises is charged up with one-half of the total expense. That is why we have been able to study this over so much and to go over so large an area and learn so many little things about it we did not know before, not so much with reference to the habits of the insect, as the treatment of it.

I would simply say in regard to the treatment that I have sprayed with whale oil soap, using two pounds of soap to each gallon of water. That makes a strong mixture, but we must get something that will penetrate the covering and reach the insect underneath. We have used soap for the reason that in all of our treating, which means hundreds of thousands of trees, in not a single instance have we done any damage. There has not been a single complaint of any damage done. That is one point we have learned. But there is another thing we have learned, and that is we must not use whale oil mixture upon bearing peach trees in mid-winter. If we use this preparation upon the bearing peach orchard before the buds start in the spring, we will kill practically all the fruit in the orchard. If we use it the same strength after the buds begin to swell in the spring, after the time they begin to push out, we will do no damage whatever. I do not know why that is true; but we never treat a bearing tree in a peach orchard in the winter time, but let those go until spring and then go after them in full force. You see that we can very easily do thousands, yes, hundreds of thousands of dollars amount of damage if we did not know that we must not use this mixture in mid-winter.

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President Hobbs: Does it affect the Japanese plums and European plums in the same way?

I think it does affect plums a little, but I can not tell to what extent. We have been pretty careful in regard to plums. I think plums, possibly of the more tender varieties, and pears, also, are affected by it.

There is another point in connection with this soap mixture, which I will speak of now, and that is where we have used this in early spring there is never any trouble with peach leaf curl. Even though the amount used is not more than one pound to two or three gallons of water, there is never any trouble with peach leaf curl after we have used the soap mixture.

We have gone into this treatment quite extensively. We have used something like twenty tons of soap since last December. I had an equipment of one steam sprayer, the first one that ever came into the State of Ohio, the first I ever saw, and the first one that was ever used in the State. We have four large tanks, holding 300 gallons of mixture, and with these we use Morley's sprayer and as much as four lines of hose. Every one is adapted to two lines, but with the steam sprayer we can not get into the most difficult places in the city. We have had to treat a section of about three miles square in Cincinnati, among the best residence portions of the city, and it would not do to go on those grounds with a team when the soil is the least bit soft, and we had to contrive some way of treating those premises without getting on the grounds themselves, and some of those grounds are pretty extensive. So we set the steamer either at the driveway or at the curb, and then attached one line of hose. It may run back a hundred or two hundred feet. Ordinarily we have a pressure of one hundred pounds to a square inch. When we get back in those lots sometimes we find there is a jungle that the people going along the street will not see, and we have to have enough hose to use, with the steamer at the curb, going around among those trees and shrubs, treating them and with our facilities we can treat the highest trees we have been called upon to treat.

President Hobbs: How do you treat the very high ones?

We can use our extension rods, and we can reach up over twenty feet. The boys sometimes climb up like squirrels and go up to the top. We have some extension ladders we use in reaching the upper portions of the trees, but if the boys can climb up more readily, they do so. We do not attempt to reach the higher trees from the ground. So much for the treatment of the trees, orchards, premises, parks, cemeteries—we have it all to do.

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Now for the treatment of the nursery stock that has to be grown in close proximity with an orchard or orchards that are badly infested: We have some rather queer experiences in attempting to protect the nurserymen from what they are in no way to blame for. Some of them are not wholly without blame, because some of them are very careless. I might, in some cases, change the word careless to some other one, but there are others who are honestly doing the very best they can to keep their premises clear of anything of that sort; but over the fence, across the way, across the road or street, is an orchard that is infested with the scale. The nurseryman can not reach the man, but we can. We can manage the orchard, if the individual can not or will not take care of it; but how about the nurseryman who has been endangered from it? Sometimes in going through a nursery I find occasionally a tree that has been infested from the orchard, we know very well. We could not condemn that man's business and wreck him on any such basis as that; we must have some better reason for it; and I am going to tell you how we manage those things. In every case where we find one or two trees, and where we find no trees at all, where we find the nursery is in too close proximity with an infested orchard to let the trees be set out without some further protection to the people who buy them—suppose we find a tree in a nursery row, or a block of, say 100,000 trees, the tree is located, and then the man will begin to work around and around, gradually working outward, looking carefully for other infested trees. If we find another within ten feet away, then we condemn everything within ten feet of the original tree, and it does not make any difference whether we have found a scale on it or not, it is condemned and burned. Then we keep on going farther out. It we find nothing beyond that, nothing more is condemned, but before that nursery stock can go into the market it must be fumigated under the direction of some one connected with the department and ordered to oversee the inspection. As a further protection, if we can find absolutely nothing, we insist upon that fumigation in a room constructed particularly for the purpose.

Some of you may think the way to do, if you find one tree, is to condemn the nursery and have it all burned. You would not think that way if you were in the business. A business you have spent a lifetime to build up can be wrecked in a very short time. I can wreck it inside of a week. But the owner of the nursery has rights, and he has a right to justice. After we have cleared up everything that would be apt to endanger his patrons, then his stock, before it can be sent out, must be treated in this way; and I want to say right here that hydrocyanic acid gas is one of the most deadly poisons known to the chemist—we use cyanide of potassium and sulphuric acid, which you must all know is a very deadly

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poison, and combining the two and water forms a gas that is practically as deadly as the two ingredients put together.

I can illustrate, perhaps, a little to show you what the effect would be. After this stuff has been kept in this room with this gas for a certain length of time the doors are thrown open and ventilators are thrown down, and everybody is forbidden to go into the room for a certain time, from twenty minutes to half an hour. In one place a colored man thought that half an hour was a little too long. He did not want to wait so long, and he went in to get some trees, and he suddenly fell over. They pulled the fellow out, and after a while he came to, and they asked him what he was doing. He said, well, he didn't know; he got in there and all at once it got dark, and that was all he knew about it. So from that you can understand the deadly nature of the gas.

As to the way we use it, we have been very careful. No man ought to use it unless he has the nature of it thoroughly explained to him, and no one but a careful man ought to have anything to do with it whatever. I find that the men who are very careful with it, but who work with it continually, complain of headaches due to the effect from the fumes. We wanted to avoid that, so we had these houses made with a slatted floor, and with an aperture perhaps that large square (indicating). Then make a minature windlass. Then put out this sulphuric acid and water on a chair or platform underneath this windlass-like affair. At the top of that attach a pan. Up through here (indicating) there will be a vertical bar. As we push that down an incline plane, this vertical bar strikes a pig or cleat and upsets the pan and throws the cyanide in so that it passes down through the slatted door and the trap door falls behind it, and in that way we save the man from getting any fumes whatever.

We have carried on a very extensive work for a year. This afternoon I will tell you something more about our manner of treating. We have been getting some results. I want to say this before closing, that I have got a force divided up into two divisions—one relates to inspection and one to treatment. One man has charge of the division of inspection, and the other has charge of the division of treatment, and I say to them: "If you find out anything new that will aid us, it is just that much for you; your pay will be accorded not exactly on the amount of work you do. If you find out anything new, we will tear to pieces the machine we have, if you will only show us some way of making it better." Consequently the boys are looking out for something; they are learning, and I will tell you something about this this afternoon.

Meeting adjourned until 1:30 p. m.

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AFTERNOON SESSION.

Friday, August 23, 1:30 P. M.

The meeting convened pursuant to adjournment, President Hobbs presiding.

President Hobbs: We will now hear the report of the Committee on Exhibits.

AWARDING OF PREMIUMS.

The judges, L. B. Custer, of Logansport, Ind.; Mr. Henry, of Laporte, Ind., and S. H. Fulton, of South Haven, Mich., made the following awards of premiums:

Best collection of summer and fall apples—Walter Ratliff, first; C. P. Bradley, second; prizes $2.50 and $1. Best plates of Maiden Blush, Chenango strawberry, Benoni and red June apples—Walter Ratliff; prizes 25 cents each.

Best collection of pears—Walter Ratliff, first; C. P. Bradley, second; prizes $2.50 and $1. Best plate Clapp's Favorite—George Seeler; best plate Bartlett, A. W. Matthews; best plate Flemish Beauty, C. P. Bradley, and best plate Tyson pears, H. H. Swaim; prizes 25 cents each.

Best collection of peaches—H. E. Haines, first; George F. Newton, second; prizes, $2.50 and $1. Largest and best Plate of peaches—H. E. Haines, first; George F. Newton, second; prizes, $1 and 50 cents. Best collection of plums—C. P. Bradley, first; W. C. Corney, second; prizes, $2.50 and $1. Best plate Lombard, H. H. Swaim; best plate Burbank, Mrs. B. A. Davis; best plates Abundance and Shipper's Pride, C. P. Bradley, and best plate German prune plums, J. B. Witmer; prizes, 25 cents each.

Best collection grapes—C. P. Bradley, first; H. H. Swaim, second; prizes $2.50 and $1. Best plate Moore's early grapes, H. E. Haines; prize, 25 cents.

Best muskmelon—J. W. Kring; prize, 50 cents.

President Hobbs: The next on the program is, "Why I Am a Horticulturist," by Mrs. Neal, of Albion.

WHY I AM A HORTICULTURIST.

BY MRS. ISABELLE NEAL, ALBION.

Horticulture is the art of cultivating gardens. Our first parents were horticulturists and the Garden of Eden was the highest ideal of God's conception of a beautiful dwelling place for them. In my fancy I see it,

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a land elysian of singing brooks and sparkling waters. There were azalias and rhododendrons, which grew into gigantic trees laden with a splendor of bloom and roses of immense size. The bushes were like the massive trees of Yosemite, and there were plants with flowers strange to be seen, and lofty palms with paths between, which stretched away into vast forests of delightful scenes.

Like that path in the wood where I used to roam,
When the oak tree leaves were green,
And the wild bird built for herself a home,
Concealed by the leafy screen;
The world never seemed to be half so good
As it did when I went to that path in the wood.

Adam and Eve were not content with their lives of leisure. God had given them the spirit of progression which gave them the desire to eat the apple. And there arose between them a contention. Adam said Eve was responsible for the desire for wisdom, and now because of this we are told that women are the weaker vessel. Show me the home of a horticulturist today where the wife is one of those weak-minded women seeking to better the conditions of her husband, preparing that which is pleasant to his taste, and I will show you one that is alert to his success.

But if there were no fruits forbidden, no joys to be denied; if the heart was never tempted and the soul was never tried; if there were no thorny pathways like the bravest feet have trod, the heart would grow indifferent and wander off from God.

I am a horticulturist because its pleasures are not confined to a few, but are so widespread that even the mechanic, the merchant, the banker, the clerk, the rich and poor alike can rest from their labors 'neath the shadows of their own vine and fig tree. The farmer that follows his plow and boasts of his broad acres of waving grain, his fields of tasseling corn and his meadows of sweet mown hay finds the one spot which is most attractive to him to be the horticultural department of his home; that Eden where Eve as of old is striving to make his home a paradise.

Oh, where could life be half so sweet,
So free from care and harm,
So independent and complete
As on a well-kept farm?

The horticulturist is a social character. With the aid of his happy family (for they are all members of our society) he brings to our meetings baskets overflowing with the best of his larder, saying nothing of the yellow-legged chickens and finest of fruits and flowers which satisfy the

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eye as well as the taste. Then he is a botanist. He goes down into the depths of the flowers, whose language speaks to the eye and the emotions of the heart. Thus the rose and the myrtle are symbols of love, the violet of modesty, the daisy of innocence, the lily of purity and sweetness, the orange blossom of charity, the laurel of glory, the amaranth of immortality and the ivy of fidelity. Each, speaking in its beauty and fragrance, arouses the better feelings and emotions of the heart. We touch them and we enjoy their sweetness; and if we but understand the language they speak to us we are made happy and feel the gentle influence of the sweetest things God ever made and forgot to put souls in. Flowers are capable of developing a love of beauty even where it does not now exist and also of strengthening it where it does exist. It is doubtful if a depraved nature could give full rein to its depravity when surrounded by the beautiful in art or in nature. There are instances on record of the softening of hard natures by the influence of flowers, and has not the criminal been brought to tears at the sight of a bouquet of old-fashioned red roses? They reminded him, he said, brokenly, of the roses in his mother's garden. Like old songs, they will come up in memory, at least some time, to be recognized and welcomed by the heart that has traveled back, ah, how far, to the old home under the hills, where in childhood's merry hours they used to play in the shadow of lofty trees, fanned by the passing breeze. And out of this old home of the past has grown for us the new home of today, having its works of art, its high walls and lofty domes kissed by the morning sun. The old landmarks are gone and we rest beneath their shadows no more; yet we oft times wander, as it were, down the path of that old home, while we drink in not only the beauty but the perfume of its long lost youth.

Oh! could my tired feet once more
Be guided to the old home door.
And could I smell the mignonette,
Those weary years I might forget.

Is it broadening too much the ordinary definition of artist to assume that whoever creates or produces—assisting and co-operating with nature—out of the crude matter of the soil objects that add to the beauty of the landscape, is an artist? The planting of a farm to flowers, vegetables, fruit trees, shrubs, canes or plants adds to the beauty of the landscape. How often have we admired the beauty of a plantation of fruit trees, such as apples, pears, peaches, plums and cherries or the smaller fruits in riding by even in winter when they were denuded of foliage, flowers and fruit; but how much more attractive they are when clothed with blossoms and foliage in May, or laden with fruit in summer and autumn. The

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florists who, through years, centuries and ages, have increased the species and varieties, adding immeasurably to their loveliness, have certainly contributed to the beauty of the flower garden. Our great variety of double flowers, with their numerous and varied forms, tints and colors, are the work of man. The great number of species and varieties of fruits owe their origin mainly to the efforts of man. Compare our most beautiful apples, such as Sweet Bough, Strawberry, Red Astrachan, Maiden Blush, Grimes' Golden, King, Northern Spy, Wealthy and numerous others of our own improved varieties with the primitive apple, if any such be found, and you will see how much the hand of man has done in adding to their beauty, to say nothing of the quality of the apple. How much the appearance of our landscape was enhanced last fall by the orchards on every farm bending under their burden of beautiful fruit. What an ornament to the table a dish of our finest varieties affords.

Consider the pear. Although not quite so remarkable for bright colors as many varieties of the apple, yet no one can deny that a tree loaded with any of our leading varieties, such as Bartlett, Clapp's Favorite or Flemish Beauty, are a great improvement in color as well as flavor upon the seedling. Then some of the varieties of the pear do not acquire their coloring until picked and ripened by the skill of man. And what relation has the peach to beauty? It is scarcely excelled by any other species of fruit. Whether we consider the white fleshed varieties, with their creamy skin changed to crimson by the rays of the sun, or the yellow fleshed, which are deep yellow in the shade and dark crimson in the sun; whether globular or oblong in form, they are very attractive on the tree or as a centerpiece on the table. Among the varieties noted for their beauty are Conklin, Crawford's Early, Crawford's Late, Alberge Yellow and Large Early York and many others. The plum has tints and shades of color differing somewhat from those of any other species of fruit. They are blue, red, yellow, purple, violet and carmine. Some of the Japan varieties are quite brilliantly colored, as are some of the Americanas. Thus we may continue through all the species of domestic fruit improved by the aid of man. The cherry, grape, currant, gooseberry, blackberry, raspberry and strawberry, each has a special beauty of its own. And all are such an improvement upon the natural production of their several species as to entitle their producers to be called artists. The earth has been made much more beautiful by their labors. In view of all the scenes that the horticulturist produces, that he who rides or walks may see how much he does to beautify the earth by improving upon nature, who would deny him a place among artists. He lives in a palace all his own, surrounded with beautiful landscapes, painted by nature, is king of all he surveys and his path is strewn with flowers.

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I do not care what the flowers may be,
Or coarser the shape or finer;
They are all one beautiful work to me,
And God is the great designer.
Children of sunshine, earth and dew,
And the great blue sky above them,
Delicate shading or gaudier hue,
Flowers of the earth, we love them.

President Hobbs: If there is no discussion of this paper, we will pass to the next, which is, "Spraying and Spraying Mixtures," by Professor Webster, who addressed us this morning.

Professor Webster's paper was as follows:

Mr President, Ladies and Gentlemen—After the smoke of the battle at Santiago had drifted away, we decided that although we had a Schley and a Sampson, and that they were good fighters, the victory was due to the man behind the gun. I want to make a keynote of this. I don't care what kind of a machine you have; I don't care anything about how you make your mixtures; I do not care anything about the mixtures themselves, unless I can know something about the man who holds the nozzle. Of the one hundred points in spraying, ninety of them depend upon the man who holds the nozzle, and we have found that out of about eighteen months' work, not only with one or two men, but with eighteen or twenty of them, not only in one orchard, but in hundreds of them; but in watching the spraying of several hundred other men, more or less careful in their work, we are just beginning to find out what spraying is.

I want to say something else, and I am perfectly willing to stand by it. I don't know how it is in Indiana, but in Ohio a man can not run a stationary engine without a license, and in ten years, I think, no man will be allowed to spray an orchard until he has had a thorough training and has a license or certificate. When you get to that, you will have spraying, and you will not have it until you do.

We have had to deal with all sorts of people. I have seen a man who intended to do good work, thoroughly sincere and energetic, and who had everything mortal man could have to do good work, to do a good job of spraying, but he succeeded in doing a very poor one, because he did not know how to do a good one.

I will give you one illustration of that. We have men who are starting out to spraying under about this condition of affairs: One or two men will buy a sprayer, an expensive spraying machine, one that has a capacity for doing a great deal of work, a steamer or some machine that is capable

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of doing a large amount of work, and then begin taking contracts for spraying orchards, not alone for insects, but for fungous diseases as well. Two brothers who, I suppose, were sixty or sixty-five years of age, men who were thoroughly honest and sincere, started out in this way, and I want to tell you how they sprayed the first orchard. I tell you they did a good job of it. They did not have an extension rod, but one man got up on a wagon and held the hose just below the nozzle, and they simply sprayed through them and let it come down on the trees, and they wondered why they did not get any results from it. They thought they were doing all right. So I want to impress that on you, that spraying, as it is done, four-fifths of it is wasted material. Yes, take the average fruit grower, not only in Indiana, but in Ohio and other States—there is not much difference in the way they do it. I know that to be true; we have found it out, and it has been illustrated again and again.

Now, as to the way we do this; it is just like this: I have had to deal with the same problem you have. I can carry, say, six men, by the month, through the entire year, but I can not carry twenty-five. In other words, I can not afford to hire twenty-five men by the month and drill them for the sake of keeping them through the winter months in order to spray. Therefore, I have to train up about one man to the machine, five of them, and for the rest we have to depend precisely upon the same kind of labor which you have to depend upon. We have to go to Cincinnati, or Cleveland, or elsewhere, and pick up our men, and pay them by the day, and the best I can do is to put a trained man in charge of each gang. That means, with an ordinary spraying machine, three men, one at each nozzle, and one at the pump, and I have to put a trained man over them with nothing in the wide world to do but to watch and see that they do the work right. It pays. Another thing that looks pretty hard. I got a pretty severe letter from a mother once, because, she said, I would not let her son talk. I let him talk all he wanted to, but not when he was spraying a tree, except in connection with the work. You can not talk politics or religion and spray a tree at the same time; you can't talk politics then, I don't care what your politics are; you may be a prohibitionist even.

Our work is all arranged just on that plan. With our steam sprayer it requires five men. We have two, one at each side to watch the men that they do the spraying properly, that they do not overlook a branch or a twig. It seems like, perhaps, a good deal of expense, and you probably think you can not afford it; but those men who do nothing else but see that the rest do their work as they should are the most profitable men you have, and you will find it so. But it takes a very peculiar man to go on a spraying force; it takes a very peculiar man. He must not only be able to detect the San Jose Scale, but he must be able to hold his tem-

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per, I don't care if a woman pitches on him; and the last is as important as the first. Talk about women holding their tongues! My goodness, me! It is not half as hard as for a man to go into an orchard and refrain from talking, except as related to the work, when they are spraying; but it is prohibited. There is no interruption; but, as I said before, I once got a pretty severe letter from a mother complaining about her boy not being allowed to talk. It is all right for them to talk sometimes, but not when working, excepting about their work.

Now, I want to tell you something about the machines we are using, and how we are using them. We have in the whole equipment one Orleans steel sprayer. We have four large three-hundred-gallon tanks, with a Morrill & Morley's pump. I do not want to advertise anybody's pump, but we use this because the men like it better and because they can do good work with it. We have been using four of those on our largest machines, except the steam sprayer. Now I told you this morning that the men are practically told to be on their guard, to be on the watch, and if they see anything about the machine that can be improved I want to know it, and they get full credit for it, and we will tear anything to pieces if we can improve it by any change. We have torn our steam sprayer all to pieces twice, and if we keep on we will get something that manufacturers never dreamed of making. When you get this one, you will notice that in front there is a barrel. As these machines come from the factory the tank is partitioned off. A portion of the front part is intended for holding water, with which it supplies the boiler. The first thing I knew my men in charge had the partition torn out, increasing the capacity, which means a good deal, because if we could have the whole tank full it would last about half a day, and they could fill it up again at noon; otherwise they would run out of material about 11 o'clock. By that means we get larger capacity. We put the barrel in front, and can supply the boiler from that by attaching a pipe from the boiler to the barrel. But we ran into another trouble. That pipe would freeze, and for a day or two it bothered us. Then we had stop-cocks put in, and when we had replenished the boiler as we let it out of the pipe we had no trouble with the freezing.

We find that some of the most favorable days for spraying is when the mercury is down to about zero somewhere. The question is how to spray under that temperature. I will tell you how we solved that problem, and I do not care how cold it is, we spray right along.

We made another connection with the boiler and put in hose so that we turned the steam directly into the tank—the way that is constructed, the excess steam goes through the tank in order to keep the material warm. We cut that out entirely and attached the hose directly to the boiler, so we can put them now right in the tank, and we can have three

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hundred gallons of mixture boiling, if we want it; and not only that, but in the morning we would bring the four tanks right along with the same boiler, and we heated the mixture in all of those tanks so we could use it.

But there is another problem that has an awful sight to do with spraying, both with the efficiency of it and the expense of it, and I do not know whether we are going to be able to do much with it or not, and that is the wind. Some of the recommendations regarding spraying you see so much of, read very nicely. It is very easy to spray if you can get a room like this is to spray in, where there is no wind at all. That is a very easy matter; but if the wind is blowing hard it is not so easy. You go out some morning and attempt to spray when the winds are going anywhere from fifteen to seventy miles and hour, and you will find that the mist that is spoken of is a good deal of a myth; spraying with a heavy wind blowing is not a very easy matter, that is, I mean effectual spraying. To do good, efficient work when the wind is blowing requires exceedingly good assistants. It adds greatly to the expense. It will make a difference of fifty per cent. in the cost of the spraying—I mean effectual spraying—between a calm day with very little wind and a windy day.

As I told you, we have to spray the peach trees in the spring. There are only about ten days or two weeks when we can spray the bearing peach trees. Sometimes during those two weeks the wind blows more continually than any other week in the year; for that reason our spraying has been somewhat expensive. This problem, if it can be, should be solved by somebody, but I am free to confess that we are a good deal puzzled to know how to go to work to overcome, even in part, the effect of the wind on our spraying.

We have overcome the effects of the temperature, and we can keep the mixture so warm that it keeps the hands of the men warm who are handling the hose. I presume the steam sprayer is new to the most of you, but I believe that with some improvement that will be just about the thing that will be wanted; then you educate the man to spray and spray right, and give him a certificate or a license, or whatever it may be, then he can buy a machine and go to work and take his contracts to do spraying. It is his business to do it at the proper time. You don't have to have that on your mind at all. That is his business to do it at the proper time and do it as it ought to be done. As soon as you have got trained men, you will be able to get it done right. So this outfit, or something like it, as I say, is probably what will be used in the future. I have no very large photograph of it with me. We also use the Eclipse, mounted on a large tank with a platform, that can be either raised or lowered. We have a platform attached to the front of the tank, and he can work very low down in that way. (Professor Webster is here using a photograph to illus-

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trate.) Or when he wants to spray a high tree he runs the extension rod up and he can spray over a pretty high tree. This is the cheaper method. There is no expense for fuel, and it requires but three men, and the fourth one to see that it is done right.

Now, if you are going to buy a spraying tank, do not get a square one. Get a round one with a rounding bottom. If you are using Bordeaux mixture, or anything that needs agitation, cutting out these corners will have more effect in keeping your mixture well stirred. A great deal depends upon its being agitated when you are using arsenical poisons. We do not use anything else. With soap mixtures it is not necessary to have it agitated particularly, but we like them better, anyway. Our tanks are all like this (indicating), holding three hundred gallons of material, which lasts about half a day, and we do a great deal of work with them.

The difference between this and some sprayers is this: In your orchard, if the trees are uniform, so that the man on each side—remember, you have four lines of hose, two on each side—and the men can make equal progress, it is all right; but if the trees are not equal and some places a tree is gone entirely, one side, then, has to wait on the other. In other words, the progress is no more than what each side could do. For instance, a tree is out, then the man on the opposite side would have to wait until those on the other side had sprayed the tree that would correspond with his. In this case there is no such trouble. This is one of the things that is avoided by this tank and sprayers. I think I explained about our method of spraying the larger trees, so I will omit that part and tell you what we have been able to do. There has been, as you know, a great deal of discussion as to the results of the use of different kinds of mixtures, particularly that of whale oil soap. We were pretty badly discouraged. I know there was a little question as to whether we could do very good work with it or not. Now I have had a good opportunity to learn the effect of spraying with whale oil soap, where I had the men for about three months—the same men continuously, day after day—using the same mixture, soap of the same brand from the same manufacturers. Where the orchards were pruned but very little, if any at all, and the wind was against us at the time, we found that we only succeeded in killing about ninety-five per cent. of the scale; but where we had calm weather we have killed ninety-eight per cent., and we have orchards where we have not been able to find a living scale. I do not want you to understand that you can exterminate the scale in the orchard by one application; I only say that this was done last winter. About a month ago I sent one man to look over an orchard and sent another without letting the second one know the first one had gone, and neither found any. We have orchards we have not been able to find a scale in since we have

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treated them, and where they were badly infested before, and in no case have we found the effect to have been less than the extermination of ninety-five per cent. of the scale destroyed. That is what we have done with whale oil soap spray, with experienced men, who were doing the very best that they could.

Now, what we have done anybody else can do with the same equipment and thoroughly well trained men. In all the work we have done we have used something like twenty tons of whale oil soap, and there has not been a single complaint of any injury to vegetation. The most serious complaint I had was from a lady, I don't know her age, and I do not know whether she was married or not; but she complained that we ruined her poodle by its getting out and getting sprayed. So I can say this much about whale oil soap, that you, yourself, can put it on so that it will be effective, if you know how, or have experienced men to do it. I have told you of its efficiency, and there is one more point I wish to make, and that is that it will not protect a tree from reinfestation, I do not believe, twenty-four hours; it offers no protection from reinfestation from adjoining trees or adjoining orchards.

I desire now to take up the matter of the use of crude petroleum. I have done some experimental work with it, and there has been careful application of it made by the owners of the orchards, and we are just getting some material together that will mean a good deal when we get through with the season. Crude petroleum acts very peculiar in its effect, not only upon the scale, but upon the tree itself. It is a very easy matter to spray a tree and not hurt it any, and it is a very easy matter to kill the scale, but when you come to combine the two you have got something else; that is where the difficulty comes. We find it has a very severe effect upon the tree, and anything less than twenty per cent. of crude petroleum is ineffective, and anything more than forty per cent. injures the peach trees more or less seriously. We have killed peach trees by using twenty-five per cent. of crude petroleum, and we have sometimes not injured them with fifty per cent., but where the injury is done with twenty-five per cent. they were very thoroughly sprayed.

You will be more apt to do inefficient work in windy weather; and you can not do as good work in a high wind as you can with the soap mixture. So far as I can see there is no difference in the effect, so far as specific gravity is concerned. We use oil whose specific gravity is 43 or 44 and we use it down to 34, and I can not see that the trees killed with oil whose specific gravity was 44, was any more than those sprayed with oil whose specific gravity was 34. We have been hoping that there might be a difference in favor of the heavy oil as regards reinfestation, but we got very disappointing observations the other day by finding the young

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scale settling down on peach trees where we had used the heavy oil and where we had done a good job of spraying. When we get through the season we will be able to tell you more about that, but at the present time, as to protection against reinfestation, the outlook is not very encouraging. At the present time I see nothing better than to go on with the use of whale oil soap. I do not think we have got to the point where we can put crude petroleum in the hands of inexperienced men, and until we reach that point I am much in favor of using the whale oil soap, for the reason that there is great danger of doing damage to the trees by the use of crude petroleum and there is not that danger with the use of soap. I believe we will leave that subject now and take up another one.

Of course, you will be interested in the pumps that are to be used because you have to use them in spraying. I do not care to be understood as advertising anybody's pumps, nor as running down anybody's pumps; but we confronted that problem last spring when we attempted to find out something regarding the use of crude petroleum and how we were going to do it. I got a Kerosine-water pump from the factory. There had been a good deal said about them. Before we did anything I wanted to know what we were working with and what we were doing, so I said to my man, "Go to work and see what you can do with this.'

In order to find out just what we were doing you spray a little while, and if this is running nicely, instead of spraying a tree take two or three dozen fruit cans with you, and by standing these cans up you can spray into those fruit cans, and see what you have been doing. I will read you the results.

Instead of spraying 5 per cent. of crude petroleum we found we actually sprayed 3 3-10 per cent.; instead of spraying 10 per cent. we found we were actually spraying 13⅕; instead of spraying 15 per cent. we were spraying 85⅖; instead of spraying 20 per cent. we were spraying 19⅘; instead of spraying 25 per cent. we were spraying 11½ per cent. This was learned by stopping in the midst of the spraying and spraying into a fruit jar instead of on a tree.

We did not know but what something might be wrong, and so we cleaned up everything just as clean as if it had just come from the shop, and tried it again. We sprayed again, and then sprayed in the fruit jars, and this is what we got:

With the indicator set to spray 5 per cent. of crude petroleum we sprayed 9½ per cent.; instead of spraying 15 per cent. we were spraying 28 3-10 per cent; instead of spraying 20 per cent. we were spraying 16⅕ per cent; and with the indicator set for spraying 25 per cent. we were spraying 18⅖ per cent.

I gave it up, as I then decided that we could not tell what we were

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doing. I then did what Americans do not like to do, sent over to Canada. I was there last fall, and they were telling me a good deal about a spraying machine that they were making, to use crude petroleum. I sent over and got one, called the spray motor, manufactured in London, Ontario. This was arranged altogether differently from the one we tried before. Instead of mixing it, the petroleum was put in one tank and the water in another. It was drawn by a separate hose and is mixed as it goes through the nozzle. It is the best machine I have struck, by all means the best; it sprays more accurately, and it is the easiest pump to work we have had anything to do with, and so far as I can see it is the best thing we have yet invented for the use of crude petroleum mixtures, and if we do anything with the crude petroleum we generaly do it with the spray motor pumps. I think they will manufacture them on this side before a great while so we will not have to pay duty on them. The price depends upon the size. The price of the one I got is $35, and if you can get them to throw off the duty that is all it will cost you. I was in a hurry and I did not care about the duty.

I shall say a little more about the other spraying, because I know there are some here greatly interested in it. We have never been able to manage the codling moth satisfactory. We have been puzzled to know what was the matter, whether it was defective spraying or why it was that we could get the apples up until about this time, and then they would drop off in spite of all that we could do.

Last year, in a small way, we thought we would see if there was anything we could do to indicate where the trouble was. So I went up near the lake shore, just east of Toledo, and went into an orchard the day after the spraying was finished. They had sprayed with Bordeaux mixture, with paris green added, three times. The next day after the spraying we covered a tree with this material you use to cover your peach baskets with, that makes the peaches have a nice color. Well, we took that material and we covered the entire tree with it. Of course, you know you can not get two trees just alike in an orchard, but we took another as a check as nearly like it as we could get, and I will tell you what we did: We removed all the fallen apples from under both trees August 9; they were sprayed the last time the 23d of June, and covered the 23d. On the 14th of September, which you will remember was immediately after a terrible wind storm which spoiled acres in Ohio and Indiana, there were removed from under the tree that was covered 229 apples; 59 per cent. of these were sound. From under the uncovered tree there were removed 1,052 apples, not over 10 per cent. of which were sound. The cloth was drawn over the tree and fastened at the trunk underneath. We took the apples out from under the cover and then replaced it. October 22 there

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were picked from under the covered tree 372 sound apples, 8 wormy. Of the windfalls, 18 were wormy. From the checked tree, the one that had not been covered, we picked 253 sound apples, 41 wormy. Of the windfalls, 104 were wormy and 94 were sound.

Recapitulation: The covered tree, after the fruit was removed from beneath, on August 29, carried 622 apples. Of these 372 were gathered in sound condition, and 26 were wormy. The uncovered tree, after the fallen fruit was removed, August 29, carried 1,544 apples, of which 347 were sound when gathered and 145 were wormy. The summary would read thus: Covered tree gave 507 sound and 120, 19.1 per cent., wormy; the uncovered tree gave 452 sound and 1,092, 70.7 per cent., wormy. This, I think, shows pretty clearly what the result would be if we could manage the second brood of moths.

You can spray your orchard carefully and effectually, but your neighbor just over the fence will raise enough moths to bring on a second brood that will do you a great deal of damage. This experiment was made to show that. You can reach the second brood of moths when the caly end of the apple is turned outward, if you can get the poison there, and we are trying this year an experiment we hope will do that very thing. We are using, instead of paris green, arsenite of lead, something that adheres to the tree. They are using it with Bordeaux mixture, trying to get it in the calyx of the apple, before the calys closes over, to see if it will not kill the second brood. It is too early to see, because we have not reached the time, but we will be able to say in a few days what effect this has upon them. At the present time we can not say, but I can say this, that since we have used the Bordeaux mixture and the arsenite of lead, there was very much less fruit dropped from the trees where we used the arsenite of lead. There is that difference in favor of the arsenite of lead, although it is a little more expensive.

If we can succeed in finding something that will protect the apple from the second brood we will have to find something that will protect the man who sprays from his neighbor who does not.

I desire to speak a little further about this matter of spraying being done by inexperienced men. It can be no better illustrated than by this: People seem to think that spraying is something that can be done when they have nothing else to do. I want to say to you in this connection it is something you can not put off. You can not do that. When the bloom falls off from the apple you will find the calyx open in that shape (indicating); a little later it begins to draw in and continues until it is closed so it is almost impossible to get the poison in. If you spray your trees when the calyx is wide open and it catchs the poison in it and it fixes there until the calyx closes and covers it, then you have accom-

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plished all that you can with one spraying. If you let it go because something else is hurrying you, thinking you can do it when you can not do anything else, then you will see what a difference there will be.

This is the very reason, more than anything else, we are coming to the point where this work will be turned over to a professional man, a professional sprayer. The time will come when we will turn the matter over to them and pay them so much a tree, and pay no more attention to it. You will get rid of that bother; you will know tnat it will be done right and at the proper time. And what I said in regard to careful spraying will apply just exactly as well in your apple orchard as it will elsewhere.

There is one point I have seen agitated much. We spray apple tree limbs, but how about the trunk, and how about the grass and leaves underneath? It looks as though we have been leaving out one of the most important points, where we simply spray the tree and let everything beneath it go. Now, it seems as though the better way is when we finish the tree to give the whole area underneath a pretty careful spraying and finish the job up in good shape.

President Hobbs: How do you apply the spray? How does the man hold the nozzle? Where does he begin and where does he wind up? Does he spray from underneath, on top, or how does he do it?

Professor Webster: We spray both from underneath and on top, or from above. All of our nozzles are attached to extension rods, and we start at some particular point on the tree, and go over both the under and the upper side, until we get around to where we were when we began. I do not know whether you do it here or not. They have a way in Ohio of spraying one side of a tree when the wind blows from that way, and spraying the other side when the wind blows from the other way, but in the meantime the dividing line gets badly obliterated; some of the limbs get a double dose and others none at all. It is a very bad practice.

President Hobbs: How do you do if the wind does not change at all?

Professor Webster: Some are waiting yet for a change of the wind. In the meantime, we must finish the job for the protection of the neighbors. If I have overlooked anything I wish you would call my attention to it; and also feel at liberty to ask all the questions you desire, and I will answer them if I can.

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President Hobbs: You say your State appropriated $15,000 for the extermination of the San Jose Scale; I wish you would tell whether the State has got its money's worth?

Professor Webster: If it has not, it has not been our fault.

President Hobbs: The point is this: I wish to know whether you are hoping to be able to, or whether you expect to exterminate the scale, or what the practical results are?

Professor Webster: The time has gone by when we can exterminate the scale in this country. The time was when it could have been done, but that time has long since gone by. The most we can do now is to keep it down. I can illustrate that very nicely: We have some nurseries in the State with that scale creeping up nearer and nearer every year. We have to stop it, or those men will have to go out of business. If we can not check it so it will not spread any more, they will have to move or go out of business; if we can check it, we will protect their property. All I am expecting to do with what we have got, is to get it under control, and if the State will give us money to keep it there, well and good. I have been working this very hard. If I do not get anything more in the way of an appropriation at all, we will have received enough out of this in the way of spraying experiments, and what we are now learning in the way of methods and machinery, to have made it a profitable investment. The nurserymen and fruit growers may not have $15,000 worth of information, but they will have a great deal more than they had when we began. I think we shall be able to tell them enough that they will save, not only $15,000, but a great deal more.

Professor Troop: As to the professional sprayer, isn't there the same danger here that we have in the professional tree pruner in our cities under the present conditions?

Professor Webster: We have no professionals now, that I know of. My idea is this: You will have a class down at Purdue to drill in spraying, careful spraying, and the mixing of the ingredients and the application of it by machinery, and the machinery and everything connected with spraying. You and Prof. Goff will have that in less than ten years.

Professor Troop: We have now.

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Professor Webster: When they go out from that university, their diploma will show that they are competent to do just that kind of work. I do not know whether it will come up in the form of a license or not, as in the matter of stationary engineers in the State of Ohio; it may, or it may come up in the way of a diploma, but we are getting to that point, and sooner or later we can debar a man from doing any business in spraying, unless he is competent to do it.

Professor Goff: But recently it has been advocated in some agricultural papers that a man in every township take up the matter of spraying in the township, but there is the very danger we have been talking about, unless he is a trained man.

Professor Webster: We will hasten the time when a man must show he is capable of doing what he pretends to do.

Mr. McMillan: What do you do toward protecting the body of the tree? Do you do anything toward protecting the body of the tree, and the roots from disease?

Professor Webster: I do not know that I catch your meaning; protect them from what?

Mr. McMillan: Against borers.

Professor Webster: No; that is entirely foreign to anything included in our duties.

Mr. Bradley: I would like to know if you have had any experience with the Hazeltine Moth Catcher, advertised?

Professor Webster: I have not had anything to do with it at all. It is good for nothing. I have received letters from them, and never answered them. They have written me again and again, but I have never replied. A few days ago I received a letter from them asking why I had never answered their communications. Mr. ——— had one sent to him for trial, and he put it out in the orchard to catch the insects. He brought it in in the morning. He had caught a lot of insects, some injurious insects and a good many beneficial insects; some destructive to some things, but not at all to the orchard; but if there was a codling moth caught with those this summer, it succeeded in getting itself so bady used up that we could not recognize it.

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Professor Troop: I would like to give a moment to this, because this moth catcher has been so extensively advertised over the country the past summer that it deserves some attention. People do not know what it is, they do not know the value of it. I have used this moth catcher. I used it last summer, putting it in the orchard about the time the codling moth makes its appearance, and my experience has been the same as Professor Webster's. I have not succeeded in finding a single codling moth in the pan this summer. We got May beetles, and several other kinds, a good many beneficial, but not a single codling moth.

Professor Goff: We have had about the same experience in Ohio as you have had in Indiana. We caught a good many insects, but not a codling moth, so far as I am able to state.

Professor Latta: As to the first and second broods of codling moth, I would like to ask Professor Webster what per cent. of the codling moth has come from the first and what from the second hatching?

Professor Webster: Do you mean in any particular orchard?

Professor Latta: Any particular orchard that has been sprayed?

Professor Webster: It is pretty difficult to state, only in a general way. We have had just this trouble: We spray carefully, and there would be scarcely any apples drop until about this time or later. Now the best we can make out of that is this, that we had destroyed all of those worms before they had got into the apple; we could not make anything else out of it. Then in September comes another regular shower, and ten, twenty, thirty, fifty per cent. or perhaps more, of the apples fall to the ground and are wormy in spite of anything we can do. The only construction we can put upon that is that the moths that hatch in the adjoining orchards deposit their eggs on these apples, and in that way the man who sprays suffers for the neglect of his neighbor.

Professor Latta: Another lesson in co-operation.

Professor Webster: If we can only get so we can do it.

President Hobbs: How strong a solution can you use on the apple, say, when you spray for canker worm?

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Professor Webster: We have got to the point where Paris green is a little too much. I suppose we could use six ounces, instead of four, to fifty gallons of water, if we used lime with it; that is, if the Paris green is as it is supposed to be. I do not remember that we have ever tried to use more than that.

President Hobbs: You know originally the farmer was to put one-fourth of a pound to fifty gallons of water; he increased it to one pound.

Professor Webster: Do you find that effective as against the canker worm?

President Hobbs: Yes; if it is applied properly.

Member: I used to spray for plums several years ago, and it did not do any good at all. Then I made the mixture stronger and it destroyed both the leaves and the plums, and I thought it was going to destroy most of my little trees. I used about five tablespoonfuls of Paris green to one gallon of water. I killed the plant lice, and I nearly killed my little plum trees. However, they revived and are now growing. I would like to know what the proper thing is to spray with for plums.

Professor Webster: It is a wonder you did not kill all of your trees to use Paris green in proportions like that. I think Professor Goff answered the question this forenoon better than I can, in spraying for curculio. Do not wait until the plum has started. The insect hides away on the ground in the leaves over winter, and does not lay any eggs until spring. Just as soon as the first warm days come in the spring they get on the buds and feed on the new buds and twigs. If you will spray just as the buds are beginning to come out you will kill a good many of the curculio. You will kill, I think, more at that time, than at any other time. So I would say, so far as that is concerned, to use the spray before the blooming, and you can spray afterwards, too; but you will find you get a good deal more good from the first spraying than any other. As to spraying for leaf-louse, I think Professor Goff told you, you would have no trouble, then, if the tree is in a good thrifty condition. We have used for that, whale oil soap suds; use one pound for four gallons of water. We have sprayed with that and got very good results and it pays to do it at the right time, for after the leaf begins to

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curl it is almost impossible to reach the insect. In the curled leaves you can not do it with any spray; but if you take it in time, and use whale oil soap mixture, I think you will succeed in keeping them down.

President Hobbs: To those who are experienced in spraying the peach and plum with Paris green mixtures, I think they will stick to the original formula of one-fourth of a pound to fifty gallons of water. There is no question about the foliage of the peach and plum being very sensitive to arsenical poisons, and I know when this was first recommended some years ago for the plum curculio, Mr. ———— of New York, an extensive flower grower, killed over one thousand bearing trees by using a little over one-fourth of a pound, a very severe loss to him. I do not think he has forgiven Mr. Cook yet, for it. Mr. Smith, I will ask you the question: Has spraying paid you?

Mr. Smith: I never received any benefit from my orchard until I sprayed it, and I have got something off of it since. I got some fruit last year, and I am going to get some this year; but I will say I have a neighbor who has been spraying all summer, and he is not going to get anything.

President Hobbs: Would you care to state why he will not get anything?

Mr. Smith: I do not know. Part of his orchard is on much lower land than mine, but he has the same kind of trees set, and at just about the same time as mine. I do not believe he has cultivated his orchard as much as mine, although mine has not been cultivated much in the last two years; since the biggest limbs have become so low it is impossible to get through. If you will pardon just one suggestion that comes to me at this time, concerning the heading of trees low. That may be all right for peach trees; I judge it may be; and it may be all right for apple trees, but I do not think so, if we are to take the modern methods of cultivation of the orchard, for we will not be able to get under the trees. Peach trees can be kept in and you can reach under them, but apple trees are large trees. If I cultivate my orchard, I have to repeat what I did a few years ago, cut off a large number of large limbs. My experience had been with the apple and pear trees, they

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do not get higher, they get lower. As they reach out, the limbs become heavy and the weight of the limbs bring them lower and lower each year, and when you come to putting a few bushels of apples on them they will come down to the ground, practically, and when the tree is full of fruit the limbs will droop down until they lie on the ground. I have had limbs in my orchard lying on the ground. So I am now somewhat in favor of heading the apple trees higher, because I have once or twice taken off very large limbs that I might cultivate the orchard, and I have to do it again, if I cultivate it. I am now trimming my trees higher than I did at first.

President Hobbs: We will now pass on to the next topic on the program, which is "Why Prune and Thin?" by Prof. E. S. Goff.

Professor Goff: Mr. President, Ladies and Gentlemen—When I noticed the wording of the subject on the program, "Why Prune and Thin?" I thought at first that there was very little to do, because you only asked me to say why I would prune and thin, which could be told in a very few words; but I have since changed my mind about it, because really it involves the whole problem of pruning, for if we know why we prune, then we will know how to prune.

PRUNING AND THINNING.

BY E. S. GOFF, WISCONSIN.

[Abstract.]

From specimens of apple twigs, the speaker showed that most of the buds that form on the young wood fail to develop into branches. Many never start at all; many that do start are crowded out by shade produced by the growth from the terminal buds. Some develop into fruit spurs, which may continue to bear fruit during several years if the growth beyond does not become so dense as to unduly shade them.

Nature prunes trees by the most costly of all processes, i. e., by starving the superfluous branches to death. The fruit grower may aid nature by cutting off the superfluous branches while they are small, thus permitting the nourishment that would otherwise go to them while they continue to live to be used by the other branches.

Flower buds are mainly formed on fruit spurs, in the apple, but they will not form without plenty of light. It is, therefore, necessary to keep

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the outer ends of the branches sufficiently thinned out so that all of the fruit spurs may have access to plenty of light.

Certain varieties of the apple, plum, peach and some other fruits tend to overbear in seasons favorable to the production of fruits. In this case the fruits should be thinned, while small, by picking off those specimens that have been injured by insects or that are undersized. Thinning enables the rest of the fruit to grow larger, tends to keep certain insects in subjection, reduces the draft upon the tree and relieves the necessity of marketing an inferior grade of fruit that never pays expenses. It also helps the fruit grower to build up a reputation for choice fruit. Thinning does not, however, increase the total yield of fruit. On the contrary, it generally reduces it.

President Hobbs: I would like to ask you this question: Are fruit buds and wood buds interchangeable? That is, will the flower bud become, under certain circumstances and conditions a wood bud, or vice versa.

Professor Goff: On that point, I can say yes, in the case of the apple; it is practically certain, in case of the apple, that the bud may become a flower bud. I limit it to the apple, because the apple is the fruit regarding which I have been able to make an investigation.

President Hobbs: How late?

Professor Goff: It depends upon circumstances, when the conditions come. The flower will form some time during the summer, in the month of September. It may form as early as July, or it may form as late as September.

President Hobbs: It can't possibly form in the spring, are we to understand?

Professor Goff: No; I don't think the flower bud ever forms in the spring.

President Hobbs: When fruit buds are pretty generally killed during a severe winter, when the buds have become scattering, it has sometimes been that they have been converted from wood buds into flower buds, have they not?

Professor Goff: I do not think so. Of course, I would not say positively. I know it is rare, and I think it is impossible. As to the question, will the flower or fruit bud turn back to a leaf bud,

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I would say, I think if that occurs, it is rare; I think that after the flower is finished, and formed into a bud, and formed all the parts, it never can change. It is true, however, flowers do sometimes develop leaves after they have commenced to form. I suspect the reason is this: The flower commences to form and forms part of the organs, and then conditions change so the growth impulse is encouraged. In regard to other fruits, I think it is true of the plum, the cherry and the peach. We all know of the peach, that of the three buds that develop side by side, the outer ones form flowers, and the other one continues the growth. In the case of the plum, the central bud will also develop into a flower. It is also true of the peach, that the side buds also may develop into branches. So I think that I can make this statement regarding the bud of the apple, the plum, the pear and the peach—these are the only ones I have studied—any bud may become a flower bud, and when it becomes a flower bud depends entirely upon circumstances.

Take this branch (holding branch in hand). The growth commenced at this point two years ago. Some have continued to grow. Here is one that stopped growing early. It possibly developed into a flower bud. Here is one that may possibly have flowered last year. This one did not do so, because it grew. This one, if it continues to grow, will finally form a flower; it may be next year, it may be in five years. The cases depend very largely, if not wholly, upon nutrition, and the amount of water and light. If they receive the right degree of water and the right degree of light, they will form flowers; if they receive more, they will not form flowers. If we undertake to extract water from a tree in order to produce flowers, we shall probably fail. The branches must be in healthy condition or the bud will not form flowers.

Professor Latta: What is the principle underlying the growth of trees late in the fall? Something was said about late cultivation tending to continue the growth.

Professor Webster: The second growth period often occurs in August. It does not often occur. Just why this second growth period occurs is not very well understood, I think. It is possible it may be explained in this way. What cuts off the first season of growth is a shortage of water. The tree in the spring is filled with water. When the growth starts it draws on the water rapidly.

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Pretty soon it comes to pass that there is not water enough to keep up the growth of the leaves. By and by the amount of leaf surface develops, and, taken in connection with the fact that the weather is growing warmer and dryer and evaporation is increasing, the tree will stop growing for the reason that there is not enough to supply those leaves and continue the growth. When this growth ceases, we have a reaction. The growth has ceased, and the amount of water used is less. The roots may be able to accumulate a little again. If we have more wet weather, it will again start a second growth.

Member: Will it not sometimes happen to those in a dooryard where you have all the water you want, and more than you want?

Professor Webster: Very likely it would; if a tree receives an abnormal amount of water, it will tend to continue the growth, but those trees, as a rule, do not form any flower buds. There is one point that has been lately recognized, that the conditions that make a crop of fruit, a good many of them do their work, or act, the preceding year. For instance, the fruit crop for next year will depend very much upon the weather this summer. It makes the subject more complicated, but it is true. The fruit crop for next season has perhaps already been settled, largely. The development of that crop will depend much upon the weather next summer, but the beginning of it has already taken place, probably.

Mr. Snoke: Would not early pruning, say September pruning, have the effect of producing flower buds? I saw a statement in an agricultural paper to that effect, that pruning early in September would have a tendency of producing flower buds.

Professor Webster: I do not just see why it would do it; and I am not prepared to say it would not. It is well known that pruning early in the spring and thus checking the growth, will tend to make flower buds for the next year. Just why pruning in September would be more effectual than at any other time, I do not now understand.

President Hobbs: It is now getting late in the evening, and I believe Professor Latta has a few words to say before we adjourn, and we will hear him at this time.

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Professor Latta: I would like to make an announcement or two before we adjourn. Professor Goff's talk has interested me very much, and I wish that I might sum up in a few words the good things of this meeting. I could not do that now, but I am sure you will all agree with me that instructions of the highest order have been given here during these few days; and I think you will agree with me when I say that I believe from the interest that has been manifest here, that many have been studying along these lines as well as listening to the papers and addresses given here; and I believe they will go away thinking about these things and investigating. I believe that the good of gatherings like this can hardly be overestimated.

Do you know, brothers, that in a child the perceptive and receptive and reasoning faculties are keen. The boys and the girls see and hear lots. And there are boys and girls here today who have seen and heard a great deal today. If their powers, home-training and early school training have not been sadly defective, they will come to a new womanhood and manhood.

Now I want to make a plea for a school, not for a day, nor for two or three days, but for weeks and months and years, for these boys and girls who are just coming into womanhood and manhood, with those observing powers still keen, with life still before them, for a good outlook for long years. Imagine that this meeting might be continued, we will say high class instructions, from day to day, before these bright pupils with their keen intellects, those who are not yet loaded with the cares of life and its responsibilities—who can say how much they could get from a few weeks, or a few months, or years of such training, such instructions? That is just what is being done for the young people at the great agricultural college. Such a meeting as we have had today is prolonged through weeks and months—of some kind of systematic study. They are taught all the whys and wherefores, by doing a thing precisely the wrong way, and then the right way, in various ways, until the best way has been clearly demonstrated and is definitely fixed as a part of his method.

Who can estimate the value of this kind of instructions at this stage of life, which this college is fitted to give? We hope to add some young people from this county, and from the portions of the State represented by this audience, to the number at Purdue. We

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know Michigan draws some, and Wisconsin draws some; we do not want them to all go over there and receive their training; we would like a share.

I know that these young people at such a school get an inspiration and an incentive to carry out and continue what they learn there to make successful fruit growers, agriculturists and stock growers. I will not take the time to go into details; you have a very good idea of what we are doing by what has been said here before, that is, as to the methods and purpose of such a school. But this I wish to say: I wish you to bear in mind that the facilities at Purdue are being improved; our new building will be the best on the college campus, which is now in process of erection, and will be for the exclusive use of the school of agriculture. That ought to be pleasing to the farmers and fruit-growers. It will be not only the best building in construction, but it will be the most imposing. It will be the largest single building on the campus. You have no idea what a nice building it is. We want you to come down and see it for yourselves and see what we are doing along these lines.

Now, as to what we are doing for the girls. We have been for over two years, giving to young women who come for instruction, a course in domestic science. It includes household chemistry, cooking, and studies along this line; combined with horticulture that makes a very nice course. We had Mrs. ———— of whom Mrs. Meredith spoke, with us last winter, and we shall, I think, have one of her pupils with us the coming winter, to continue this work. We want to continue the work, and do not want you for a moment to think that the girls are being neglected. We are looking after this work, and expect to meet the demand for it, and only desire to have the demand increased. I think we may be able to, a year from this coming September, incorporate this work as a part of the regular work. We are trying to do so, and we are giving the young people special preparation for their life work, and with that we add an incentive and inspiration to use their splendid training in the every-day walks of life. And I wish to say that seventy-five per cent. of the graduates of the school of agriculture are now in the fields.

The last meeting of this series will be held at Huntington, Tuesday and Wednesday of next week. I should be pleased to have anyone who can, from this audience, attend the meeting there. The

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purpose of that meeting will be for the benefit of the people engaged in raising stock, especially those engaged in growing stock hogs, sheep and cattle.

President Hobbs: I wish before adjourning to commend this audience for its good attendance and interest in all of the sessions of these meetings. I wish to commend the local horticultural society for its efforts in making our stay here so valuable and pleasant; and we are certainly very much pleased with their excellent fruit display.

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FORTY-FIRST ANNUAL MEETING

OF THE

Indiana Horticultural Society,

HELD IN

Room 12, State House, Indianapolis, Ind.,

DECEMBER 5 AND 6, 1901.

MORNING SESSION.

Thursday, December 5, 11 A. M.

The President, Mr. Hobbs, called the meeting to order and declared that the first business in order was hearing and disposing of the reports of officers.

Prof. James Troop, Secretary, made his report as follows:

SECRETARY'S FINANCIAL REPORT.

SUMMARY OF RECEIPTS FOR THE YEAR ENDING OCTOBER 31, 1901.

Received for membership fees	$108 00
Received for fruit sold	12 01
Total	$120 01

SUMMARY OF CREDITS.

Due secretary October 31, 1900	$6 95
Paid for freight and express	15 84
Paid for postage, stationery and printing	65 37
Paid for telegrams and telephone	1 43
Paid for typewriting	1 00
Paid for traveling expenses	7 20
Balance due the secretary	22 22
Total	$120 01

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ACCOUNT WITH THE TREASURER.

To balance on hand November 1, 1900	$351 82
To cash from secretary for membership fees	108 00
To cash from secretary for fruit sold	12 01
Total	$471 83
He has paid warrants 1 to 29, inclusive	484 96
Overpaid and due treasurer	$13 13

J. TROOP,
Secretary.

The Treasurer, Mr. Sylvester Johnson, not being present, his report was deferred till a later session.

Mr. Hobbs: I will appoint Mr. W. C. Reed, of Vincennes, and Mr. E. Y. Teas, of Green's Fork, as a Committee on Exhibits.

Mr. Hobbs, President, then read his address, which contained a survey of the year's experience in horticultural matters, together with lessons learned therefrom and suggestions for the future. (No copy of his address was obtained.)

Mr. W. W. Stevens, Mr. L. B. Custer and Mr. Campbell were appointed as a Committee on the President's Address.

Mr. Hobbs: We will now consider the subject of "Conditions of Success in Growing Stone Fruits." Mr. H. P. Dean, of Greenwood, will introduce the subject by considering the peach.

PEACH CULTURE IN INDIANA.

BY H. P. DEAN, GREENWOOD.

Now as to the subject of growing peaches successfully, I will divide it into several parts, the first being: Necessity of healthy and reliable trees. To secure these, you must either know your nurseryman, or, better still, grow the trees yourself. To obtain trees that are absolutely healthy, seed should be secured from wild or seedling stock, as far south as Tennessee or Georgia, on elevated lands, where severe winter killing and premature ripening are unknown. Next, buds should be secured from bearing trees to insure not only infallibility in varieties, but freedom from diseased stock, which can not always be discerned in younger trees. The practice of nurserymen of cutting buds from nursery rows is bad for the ultimate success of both themselves and the grower.

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There is some good authority for the statement that trees bear earlier when budded from bearing trees than from nursery rows, but on this point I am ignorant and would gladly learn if any present have made any investigation of that subject. I would consider this of much less importance, however, than the need of trees that are true to name, and of healthy origin. I have seen much loss to amateur growers by lack of care on these points alone, but there are other errors to be avoided.

The second part essential to success is: Proper location and soil. My experience from boyhood has been limited, having had no practical knowledge of peach growing except on the bluffs of the Ohio river, between Madison, Ind., and Louisville, Ky., on lands overlying the cliff limestone. Yet we know of successful orchards on the sandstone formation, of which the noted Willey orchards of years past on the knobs near New Albany, Ind., and the Freeman orchards of Brown county of today are examples. There is also the extensive peach industry of Michigan on the low, sandy ridges bordering the lakes, and of New Jersey on sandy plains but a few feet above the level of the sea. These last named places could not possibly be successful without the modifying influences of those large bodies of water. I think that in neither of the last two named localities does the fruit ever reach superior quality in point of richness of flavor that makes a perfect peach.

There has recently been enormous plantings on elevated parts of Georgia which are very successful. But in no place have I ever known of large successful orchards on rich alluvial lands, hence I would say secure elevated location, with clay subsoil, naturally underdrained, and comparatively worn lands, as new virgin soil, like rich alluvial lands, produce too vigorous growth of wood-making trees more susceptible to severe cold and lessening both quantity and quality of fruit.

The next thing necessary is proper cultivation, pruning and thinning. In planting it is better to have soil broken and well prepared, but trees can be planted in cross furrow and ground thrown back to trees with two-horse plow, after which ground can be broken. It has been our practice to plant on poor soil, sixteen and one-half feet apart each way, using trees one year from bud, and trimming off all side branches and top, leaving tree about three feet high, with three to five buds from which to make top the following summer.

There is no better way to cultivate a young orchard the first and second year than to cultivate the land in corn. Afterward the land should be broken early each spring and surface soil kept loose and mellow, and free from weeds, even if it require a second or third plowing. I would avoid plowing or stirring soil much after middle of July. On no account ever sow small grain or grass in peach orchards. There is nothing that

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I have knowledge of in fruit that responds as quickly to thorough cultivation as the peach. This very essential of constant and thorough cultivation is one of the strongest reasons for avoiding rich lands, in which case you will grow too much wood, and prolong the growing season, so as to endanger the loss of following crop, or the life of the tree itself on account of wood not being thoroughly ripened to stand severe winters. We have always found that the peach tree will stand severe pruning much better than almost any other fruit tree, hence we have used knife, saw and axe in various stages of growth in order to keep open head of tree to admit free circulation of air, heat and light of sun, all of which are essential to give color and flavor to the fruit. In addition to this, thorough pruning helps in the matter of thinning, which we find very necessary to produce good sized fruit whenever there is a full set of buds, in which case at least half or three-fourths must be pulled off. This is not always so, as more than half of our crops have been sufficiently thinned by frost.

As to the enemies of the peach, I believe it has fewer than almost any other fruit. The peach borer is most thoroughly combatted by filling a mound of earth about half a foot high around the body of the tree, and then tamping with the foot to prevent the fly from laying her eggs down near the tender roots, thus lessening the chance for the worm when small to enter the hard bark, and making it much easier to capture. To do this we dig the mound away in May and destroy the worm with a sharp-pointed knife, and replace the mound around the tree after a few days. The curculio, causing wormy fruit and curl leaf, can both be destroyed by spraying, a remedy we have never applied, and we never have thought our losses from these causes was very great. There is no doubt but what great benefits may be derived from an intelligent system of spraying where curl leaf is prevalent, as government experiments in California have shown.

The question of variety comes in as a very essential thing, but should be determined by experience as to which varieties succeed best in each individual locality. My father, Argus Dean, commenced his peach business with about sixty varieties, but after 15 years' experience he had reduced the list to twelve or fifteen, as having quality, hardiness and a succession in time of ripening, so as to fill the entire season from July 1st to October. We afterward added to these and discarded others, as new and better kinds came up. So I would think it a most difficult thing to tell which certain varieties would do best. There seems to be an increasing tendency to sacrifice hardiness for fine quality, which may be well enough for a small orchard, but for an orchard for profit serious mistakes may be made. I once knew a neighbor who planted about 20,000 trees, and among

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them were about 2,000 of one variety that did well on Chesapeake bay, his former home. But during the entire life of the trees he never gathered twenty bushels of peaches. Although the quality was superb, it demonstrated that a peach of any one variety will not prove profitable in all places. Now, in attempting to grow the peach in a climate where nature did not plant it, we can not hope to secure perfect results, yet the partial returns will amply repay us for our care and labor, in our efforts to have and enjoy this most delicious of fruits. Extraordinary severe winters are our greatest hindrance, as under some conditions we will sometimes lose years of labor and waiting. I have no doubt but a wind break of the natural forest, sheltering the orchard from the north and west winds is a great help, but does not always prove effectual. It is hard to lay down rules and methods of culture that will prove successful when there is absent the grower's love of his business. Constant thought, care and attention to the needs of the peach orchard, in each individual location, is most essential. It was once said of a most successful peach grower that he knew every tree and peach in his extensive orchards, so constantly did he visit and walk through them. There is so much evidence of neglect of orchards all over our country that it seems hopeless to expect any measure of success until planters learn that the same amount of thought and care of orchards as is given to their farms will render the orchard the most profitable part of their lands.

DISCUSSION.

Mr. Grossman: He made a statement in regard to spraying—that he did not think the expense justified it. I have found during the past season that peaches that were thoroughly sprayed, just one good spraying, were far better in our community than those that were not sprayed. Nearly every peach was perfect. Mr. Hobbs saw the peaches when they were green, as I sent him some specimens. That orchard was noted for the fine peaches and nearly every peach in the orchard was perfect, no curculio whatever, while orchards on adjoining farms were not sprayed and the fruit was knotty, and while there were some nice specimens, they were not as nice and large as those sprayed. Everybody had peaches there, but there was no trouble to sell these at $1.50 per bushel. Apply Bordeaux and Paris green just after blossoms fall, one spraying thoroughly is sufficient. In spraying we used just double the quantity Professor recommended last winter—one-half pound

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Paris green, six pounds blue vitriol, six pounds lime to fifty gallons water. This did not hurt the foliage.

Mr. Apple: I would like to ask whether this spraying of Bordeaux mixture will affect the insect, or whether it will prevent curl leaf in peach?

Mr. Flick: The chief use of the Bordeaux mixture is to prevent fungi and has but very little if any effect upon insects.

Mr. Tilson: I want to know how to trim a peach tree.

Mr. Dean: In trimming trees we trim to one stick, after that we do but very little trimming except to form a head, and we do that with about three or four main branches. We have never practiced heading, but we have thinned out the center, allowing these branches to grow out as much as possible so as to leave an open head. We have better results with that kind of trimming than anything else. As I have never practiced heading it would be impossible for me to tell whether there is any difference, but they will make a better growth and can stand more trimming it is said.

Mr. Burris: I would like to ask Mr. Dean if he did not find trouble in fruit breaking trees down in case of storm?

Mr. Dean: You have more trouble on that point than where we are located. Trees do not make as vigorous a growth as on soils here. As to breaking down, we always thin our trees, especially those where in danger of breaking down.

Mr. Stevens: We have some peach growers in our community who cut off about one-half of that season's growth in fall in order to secure a better crop the succeeding season. Is there anything in that?

Mr. Dean: I do not believe it would be anything towards insuring a crop. The main trouble we have is with severe winters, and more than half our crop was thinned by frost. Peaches do not succeed well on rich soil. You want poor land. You can grow nice peaches on rich soil but not of a good quality.

Mr. Thomas: He said he would cut his buds from the high hills of Georgia. The thought came to me, as I live near the northern part of the State, that to get trees budded from southern stock they

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would be apt to be more tender, but if you get them from the north, are they not acclimated to northern winters?

Mr. Dean: Get the seed from Georgia with which to start the stock.

Mr. Milhouse: Can we successfully grow peaches on the level, clay soil we have here in Marion County? I have a piece of ground naturally poor, of course not as poor as some, but it is not as rich as might be, and I have in mind to plant peaches on it. The ground is rather inclined to be level and well drained, but if it is not profitable to plant peaches on that ground I should like to know it.

Mr. Dean: Elevated land is most desirable, as spring frosts do not affect it.

Professor Beach: I have been exceedingly interested in the President's address, and what he said about growing plants in Indiana, and also the paper by Mr. Dean on peach growing in Indiana, and it is impressed upon my mind more firmly than ever, though it was impressed before, the necessity for each man to study his own conditions, and after having gotten what information he can from other people, he can work out his own salvation in fruit growing, whatever it is, from strawberries to peaches, according to his own likes and dislikes, circumstances and surroundings. With regard to this last question, as to whether or not it is well to plant peaches on level ground, I will say in some sections in this State, those of you know who have traveled through it, we have land not level, decidedly hilly, and so we have laws for observing peach orchards upon level and hilly ground. Cold air runs down hill just like water, and orchards I have been in along the Hudson River, where there is little level ground, you will sometimes find that in certain seasons when we have found winter injury of buds, they extended so far up hill and stopped, and some varieties farther than others, but all showed change of air. I know of one fruit farm of three hundred acres which grows peaches extensively and has great success and very seldom has loss in peach crops. Only one absolute failure in thirty years, and I attribute that largely to their location. On one point touched upon, I should like more definite information, that is the use of spraying for curculio. In our peach orchard where we find curculio we have come to use a machine shaped like an umbrella turned upside down with slot in

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one side, which they run up to a tree and jar the curculio off and catch them in that way. Some of our most successful peach growers are using it to get ahead of curculios, and we have the impression that spraying is liable to hurt the foliage. We are very careful about spraying peach foliage any more than necessary. We spray for peach curculio before bud opens, and this spraying is done also to prevent peach rot. Last year one-half or two-thirds of our trees were killed by the spraying mixture running down the tree and blighting the whole tree. So you will find on peach trees little twigs all over the trees with dead leaves on end of them. I suppose the spraying with the Bordeaux mixture will prevent that, and I was wondering whether you got any benefit from the use of Paris green. If any of you have had any experience in spraying for curculio or any benefit from the use of Paris green for foliage I should like to hear from you.

Mr. Flick: I do not think Paris green has but little effect on the curculio. I think I prevented the working of curculio and kept them out of the trees by using weak spray of coal oil. During the earlier growth of the leaves I think Paris green has some effect on the curculio, but I think later on it does not.

Professor Troop: My experience in spraying for the curculio is a good deal like Mr. Flick's. Where we spray early, as soon as the buds begin to start, we may catch some of the curculio with Paris green, but never have succeeded in killing curculio with Paris green to any extent after it begins its work on the fruit. Then they attend strictly to business, laying their eggs, and do not eat very much after that time. The object of the insect is to deposit its eggs and after they begin that work I do not think they eat very much, and of course die off as soon as they have accomplished their object. I do not think spraying with Paris green will do much good to catch curculio after they begin their work.

Mr. Thomas: I wish to emphasize all the gentleman said in his paper about planting peaches on elevation. I have not many peach trees, perhaps 100, and this season they bore for the first time. The rows are planted east and west, the west end runs down into level land, and the east end is on high ground, but not more than eight feet difference in elevation. At the east end, the trees were full of nice peaches, while trees in lower ground had scarcely a

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peach on them, although twice as large as on higher ground. As to pruning, I have been trying to head in and make a flat, spreading top of the tree as much as possible.

Mr. Hobbs: As to the matter of soil, he speaks about poor soil being necessary to highest development of the peach. The soil may be poor in elements that go to produce wheat or corn, but must be rich in elements that go to produce a peach crop. If trees bear good fruit they must have a certain amount of fertility regularly and the soil must not become exhausted. I think Mr. Dean will agree to that.

Mr. Dean: I refer more particularly to corn crops. In our elevated land on the Ohio river hills I presume we have all the elements necessary for peaches, and it has been demonstrated thoroughly in almost every locality. When speaking of rich soil, I refer to farm crops especially. I find older land gives better results in peach growing.

Mr. Lennen: While elevated positions are more favorable and bear fruit when low land is a failure, we ought not to be discouraged in planting, let our situation be whatever it may. My observation is, occasionally there is fruit on the elevated land and not on low, level land, and sometimes fruit along creek bottoms and not fruit on high lands, but as a general thing, when we have a peach crop, it is pretty general to all, on the low and level and elevated lands, and all enjoy that luscious fruit, so I think we ought to plant peaches. I have seen fine peaches grow on low as well as elevated land. In growing peaches in a commercial way, does not the soil become worn out?

Mr. Dean: We have never fertilized our peach trees and ground does wear out. We never repeat an orchard where there has been one before, unless we have planted it in other crops for a few years, but as to using fertilizers on peach orchards, we have never done it, but any soil will become exhausted in bearing many crops.

Mr. Milhouse: Is the cow pea or soy bean beneficial?

Mr. Dean: We have tried at one time turning under clover in one orchard and think it produced fungus on roots.

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Mr. ————: Would you advise stirring soil after fruit is gathered?

Mr. Dean: Not after first of July. A tree has to have time to ripen, especially after bearing a full crop. Would not advocate late cultivation. Sometimes we run the harrow to keep the weeds down, but no cultivation is advisable after fruit commences to ripen.

Mr. Hobbs: "The Plum" will be discussed by Mr. W. W. Phelps, of Noblesville, Indiana:

[Abstract.]

W. W. Phelps finds the wild goose plum the most profitable variety and considers Abundance the best of the Japanese varieties. He disposes of that worst enemy to plum growing, the curculio, by feeding young chicks beneath trees. In discussing the treatment of black knot, Prof. S. A. Beach, of New York, stated he had found kerosene an effectual remedy, using it to disinfect the wounds made in removing the knots and also the tools used. J. C. Grossman stated that cherries required richer soil than peaches and deeper planting than most fruit trees. The cherry fruit fly, which has become a serious pest in the eastern States, was reported from the northern part of the State. The insect is of recent appearance and there is no known remedy.—(Clipping from Orange Judd Farmer.)

Mr. Flick: Have you any plums growing near Wild Goose for fertilization?

Mr. Phelps: All of the varieties we have are scattered through the orchard promiscuously, twenty feet apart, insuring perfect fertilization.

Mr. Milhouse: In thinning I would like to know how close the plums ought to be. How many inches apart? Would like some rule to go by.

Mr. Phelps: To thin every sort is a pretty hard job. If thinned properly only just far enough apart so that they would not touch each other.

Mr. Custer: Last season I had Burbank and ten times as many on the tree as necessary, and after half grown or little more, I thinned them out so no two touched each other, and they got to be a good size.

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Mr. Hobbs: If they touch, soon rotting comes on, and it begins where they touch, and if thinned well it will preserve the vitality of tree.

Mr. Milhouse: I had a Burbank tree this year which was full for all there was in it. I thinned part of the tree to about eight inches and would have had more profitable crop if had picked all over that way and left a plum at every seven or eight inches, they would have brought more money.

Mr. Milton: Is there any other method for controlling rot on Lombard and such varieties of plums except thinning?

Mr. Apple: I prevented rot in Lombards the past season. I commenced spraying before buds opened with Bordeaux mixture with a little Paris green, and after the bloom fell, every ten days until fruit began to color, and saved a good crop of Lombards.

Mr. Howland: Last year all the Bradshaws rotted. I got just one plum off of four trees, and they were loaded full. This year I watched them closely and sprayed early in the season three times. When they commenced to rot I sprayed very strongly with Bordeaux mixture and saved a splendid crop.

Mr. Thomas: For something like four or five years the Lombards have rotted so they were hardly worth doing anything with. This year I did not spray and had the finest crop of Lombards I have had for years.

Mr. Henby: I have had the same experience with Lombards as Mr. Thomas. Last season I had more Lombards than I knew what to do with. Two years ago all rotted, three years ago all rotted, and I pulled all the rotten ones off and cleaned up everything. A year ago last season I left the rotten ones all on, and concluded it was not worth while to spend any more time on Lombards, and abandoned all hope of having any more to ripen on trees, and last season, I had more than I knew what to do with, and called the neighbors in to pick them on shares.

Mr. Shoemaker: I believe the two gentlemen are attributing their success this year with the Lombard to the wrong thing. There has always been some rot on Robinson, Wild Goose, and particularly on the Burbank and almost all European plums. I find this season scarcely any rot whatever, and attribute it almost entirely to

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the season. It was a very dry season this year, and the disease or fungi that caused rot did not propagate. Particularly in seasons when it rains heavily and becomes hot afterwards, alternating wet and heated seasons, it is impossible to save plums from rot, especially Lombard and Burbank, and it is my idea that it is on account of the dry season this year that we have had no rot. I have had no rot on any variety to amount to anything this year. I would like to ask something about this bug catcher. Would like to have a special description so I can make it. I do not want to use it on peaches but on plums.

Professor Beach: It is a very simple arrangement. They have a low axle with two wheels and the cloth they use for this umbrella shaped concern is ordinary common cloth. It has wooden arms like an umbrella to spread it out, and at the center it opens into a tin box, and as they jar the trees they use brooms to wipe down the bugs into the box and then burn them, or otherwise destroy them. I can not give you exact measurement of it. It is known as the Johnson Curculio Catcher, of Geneva, N. Y. We find it necessary to run this bug catcher two weeks and longer. We start in with apricots as soon as the buds begin to swell. I have not full confidence in spraying to control fruit crop fungi under the worst conditions. This gentleman is right in describing the conditions which are favorable. I believe we can help keep matters under control by spraying. Copper sulphate alone seems to injure the foliage and we prefer to use ammonial solution. I do not wish to discourage spraying, but believe we want to get at the truth of the matter, and my impression is we can not always control fruit crop fungi, yet we can help. We always spray our plums for leaf spot. Sometimes in August, just about the time we want the foliage to ripen fruit, the foliage will all fall off and leave the limbs bare. I have in mind one orchard where they did not get the fruit off, and the result was they lost a great many trees the following winter, because they allowed the fruit to ripen when leaves were off. It is something we can not control by spraying, but in spraying you lessen fruit rot fungus. It is easy to spend more time in spraying and in thinning than the fruit is worth. If you are going to thin for size of fruit, you want to begin early. If you wait until the fruit is half-grown you do not get near the benefit you do if you start early.

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Mr. Swaim: I would like to say for the benefit of those who have never had experience in catching plum curculio in this way, that it is the early riser that gets the bugs. The plum curculio is much easier caught very early in the morning while it is cool than they are after the sun gets up and warms them up, as they will fly like a potato bug.

Mr. Davis: For the small plum grower who raises a few for his own use, I want to give a receipt that beats anything given yet, as it is very cheap and simple. In the evening about sun-down, when there is no air stirring, build a fire of old chips or something under the tree that will not blaze up, a few old rags and a handful of sulphur, and those fumes will rise up and settle in the tree, and when you shake the tree, every curculio will drop to the ground. Do this every third evening for a while and you will have a fine crop.

Mr. Shoemaker: I would like to ask a question regarding varieties of plums that grow in this section. It is not necessary to bother about curculio on Wild Goose, Robinson or Pottawattamie, or any native plum I know anything about. The curculio only helps thin them out. What European plums can we raise in this country that the curculio does not bother?

Professor Beach: I do not want to give information about varieties, but speak of one variety that came from the western nurseries, which in color and shape is somewhat like Wild Goose, but is better in flavor, that is, the Chas. Downing. I would like to get your opinion as to its productiveness. It belongs to the native class.

Mr. Hobbs: It was in cultivation ten or fifteen years ago in parts of the country, and west, but it seems to have dropped out in recent years.

Mr. Howser: The little Blue Damson is the only one I can ever make any money out of. It is not what I regard a fine plum, but they are a great yielder and they will sell.

Mr. Kingsbury: I was just going to ask in regard to that variety, whether they are not also subject to black knot—more so than any other plum?

Mr. Howland: I have been growing it for more than forty years, and I now have some fifty trees of it, and in the forty years

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I do not think I have gathered wood enough that had black knot on it, that I could not grasp and put in a cook stove. All diseased wood should be burned when cut off. However, I have seen a great deal of it, and know of trees which were loaded down with it, and died because of neglect.

Mr. Custer: I have been growing little Blue Damson for eighteen years, and it proved successful with me. More money in it than any other, and I have never had black knot, except on one tree brought from the other side of Columbus. I cut it off and burned it, and have never had any since. There is little black knot in our part of the State.

Mr. Little: What do you do when it comes on side of a limb?

Mr. Custer: Cut it off and burn it.

Mr. Houser: I never saw but one tree that had knot on it, and that was a peach tree about as large as my arm. Mr. Denny was showing me the orchard and wanted to know what to do with it, and I told him to cut it out with a chisel.

Mr. Custer: In parts of Ohio where I got my trees, they have had black knot so bad they had to destroy all their trees.

Mr. Hobbs: Professor Beach, what is your experience in cutting knots off level with branch and applying remedies?

Professor Beach: We have used different things, and I suppose nothing better than kerosene oil. It needs something that will kill threads of fungus that have happened to escape cutting. The threads of fungus run all through underneath the bark, and if you leave these, of course, they will grow again and the knot will come out around edges. Other things have been tried, but I do not know of anything that will do more effective work than kerosene. Wipe saw or knife after making a cut, always wipe it with a cloth wet with kerosene, and it will not spread germs from one tree to another. You can arrest the blight in that way.

Mr. Little: I have heard kerosene recommended for knots. I cut the knots out of one tree and used coal oil, and it seemed to feed the knots and they kept growing.

Mr. King: I suspect we were troubled as much with black knot in Wayne County as any place in the State. Many trees around

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Richmond died with black knot. One gentleman, below town, had a large plum orchard, and experimented with different things. He had a mixture he used, and he told our Society about it; quite a number tried it. All we had to do was to cut off the twig, trim them a little on outside and rub on the mixture, and it killed the black knot. I had quite a number of trees that had started black knot. I went home and applied the mixture, and it killed the knot in every instance.

Professor Troop: That was chloro naphtholium. I saw that same orchard near Richmond. The man showed me all through the orchard where black knot had been very bad on branches three and four inches in diameter, and a couple of years before that he had painted them over with chloro naphtholium, and when I was there they were all grown over as nice as could be. I think our crude petroleum will answer the same purpose. I will say that this black knot comes under our law concerning injurious plant diseases, and wherever it is known I require it to be cut out and destroyed. There is a good deal of it in the State.

Mr. Teas: How do you apply it?

Professor Troop: Apply to the knot with a brush. Trim off the knot and paint it over.

Mr. Grossman: There is one variety of plums on which I wish the experience of others, and that is the Wickson. I would like to know if any one has had any experience in fruiting it? It fruited for me for the first time this season, and I was very much pleased with it. It is very large and fancy and nearly every plum on the trees were perfect in every respect. I had always read and seen it mentioned in the horticultural journals that Wickson was very tardy to come into bearing. These were set two years ago last spring, same age as Abundance and Burbank, and yielded equally as heavy. Same color as Japanese, yellowish skin overlaid with red, rather purplish red when fully ripe.

Mr. Reed: The Wickson around St. Louis this year has done exceedingly well. I was talking with several men growing plums quite extensively, and they say Wickson does the best of any Japanese variety there. They are planting it extensively there, but I do not think it does well in this State.

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Mr. Custer: How about the Osage plum?

Mr. Henby: I would like to ask the gentleman who read the paper on plums as to his experience with Pottawattamie. My experience with it as an orchard tree is, that it is very short-lived, and not profitable for market on account of skin being pale red and not attractive. It does not sell well in our market. The tree overbears and bears itself to death in a very few years. We only get two or three crops from it until it dies.

Mr. Phelps: Can not say as to length of life, as my trees are five years old and have borne three crops. I think it is much better than Robinson.

Mr. Shoemaker: The Pottawattamie has been bearing several years for me. They are about nine years old and have been bearing very heavily ever since they had any top at all, and they show no sign so far of dying. They have that fault of bearing very heavily every year, and have never failed. Has any one had any experience with the Winot or Hawkeye in Central Indiana?

Mr. Little: Mr. Hobbs would tell you the Newman plum is the best. I think the Minor is a very good plum.

Mr. Phelps: We have trees of Newman, but they have not borne. One point that is benefical: cut the limbs out so the sun can strike all parts of trees. The native varieties will bear enough so you can cut the tree and make it very thin.

Mr. Dean: I want to hear about the Newman plum.

Mr. Hobbs: We have been fruiting the Newman several years, and like it very much. The tree has rather crooked limbs, and is not very sightly. Bears reasonably young, fruit not quite as large as Wild Goose, very attractive, quality very much better than Robinson or Wild Goose or any other native variety when cooked, less stringent when cooked, and later, ripens after Robinson. I think it is one of our best native plums. Pottawattamie is an enormous producer with us, but our objection is its small size. It is not stringent when cooked. We have not fruited the Milton.

Mr. Kingsbury: The Satsuma is a Japan plum. The tree is very brittle and liable to break at the least wind.

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Mr. Thomas: I have a tree about ten years old of Satsuma, and while it has bloomed five or six years, this is the first year it has borne plums. From one to two dozen matured this year free of worms. It ripens about the first of September.

Mr. Thomas: Mr. Drampt, of Wabash County, raised a great many bushels of Satsuma plums the past year, and they were very fine, not a wormy one.

Mr. Young: I want to ask one word in regard to spraying. Some five years ago I tried to make my own solution from formulas seen in papers, but made a failure, and last year I had a number of plum trees of European varieties, Washington and others, that would rot with me every year. Last spring, early in February, I purchased a compressed air pump and also purchased from the Chemical Company preparations all ready for use, and used them very early on the plums, and also on grapes and peaches. The result was I had first-rate fruit. I sprayed some three times: began about the time the buds commenced swelling, and kept it up. Did not thin the fruit, but saved them from the rot. I made a little test of this kind and had some peaches. Sprayed part of the Bokara, and had one tree very full that I did not spray, but sprayed others near by, and those I sprayed, matured nicely and every peach on the Bokara rotted. Did not spray the Snead, had two nice large trees very full, and they all rotted. I have three sprayers, ————, compressed air and the dust sprayer, and I use the dust made up in form by blue vitriol and lime preparation; used it on one tree of Imperial Gage, and used the solution on the Washington and on the grapes. Part of the Imperial Gage rotted a little, but the Washington came through all right. My grapes, with but very little exception, Diamond, Niagara and Vergennes, all rotted with me. I used the preparation pretty strong.

Mr. Thomas: I wish to drop one suggestion in regard to rot. We ought to watch our trees and not allow anything to grow on them that is of a diseased nature. Keep every limb and affected part cut out of the tree. I commenced growing grapes thirty years ago and when my vines commenced to get old my grapes rotted badly. I noticed places where I cut off the limbs that the wood had

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died back and caused dead spots on the branches. I set a new vineyard and decided to raise on new vines. I cut off every three years and raise from new vines, and have not had a rotted grape since. I believe poison sap will be carried like blight in peach, and affect the whole tree.

Mr. Milhouse: We have a little green louse that gets on the under side of the leaf, and as soon as it gets there the leaf turns in and the louse is in the curve or roll, and you may just spray and spray, and the louse works all the same. I was wondering whether burning sulphur under the trees would affect the louse.

Professor Beach: We can not poison these insects by anything like Paris green. They are suckers, and get their living like the mosquito. They get the sap of the leaf or plant from underneath.

Mr. Swaim: I think the secret of controlling the aphis with kerosene emulsion is to take it in time. Watch the trees, and as soon as they come, use emulsion, not wait until leaves are closed up.

Mr. Stine: I sprayed plum trees with everything without doing any good.

Professor Troop: One word in regard to spraying—just this one thing ought to be borne in mind: if you are going to spray at all, spray early, whether for insects or plant diseases, and especially for plant diseases, spray before the disease shows itself. Do not wait until it gets started; then it is hard to check it. Some ask how to get rid of the currant worm. It is the easiest thing imaginable. Take it early when it first appears, and sprinkle with white hellebore. In spraying either for insects or plant diseases, do it early, and then one spraying is worth half a dozen later in the season.

Mr. Young: How many times do you advise spraying before the buds open and about when?

Professor Troop: About the time the buds begin to swell.

Mr. Shoemaker: Would you use any arsenic preparation in Bordeaux mixture?

Professor Troop: In spraying for curculio, yes, and if for black knot, no. At that season the curculio hibernates and comes out

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early in the spring. When it first comes out it eats buds and foliage, and if you are going to get it at all with arsenoids you get it then. Simply use Bordeaux mixture for black knot.

Mr. Hobbs: We will next hear Mr. J. C. Grossman on "The Cherry."

Mr. Grossman: One of the first conditions in growing the cherry will be the selection of a location. If I was going to plant an orchard of cherries I would select an elevated location with a sandy or gravelly and loam soil; it should be reasonably rich. The cherry requires a richer soil than the peach or plum. I would plant deeply, and it would be better yet if we would subsoil where the trees are to be set. The next requisite would be the trees. Secure good two or three year old trees, see that they are carefully trimmed back to two, three or four buds, and then carefully set. A great many fail in setting cherry in not setting deep enough and not compacting the soil about the roots. Cherry trees require setting a little deeper than other trees, and we often make the mistake of not compacting the soil thoroughly. It is my habit, in setting a tree, after the roots are thoroughly covered with fine soil, to get in and thoroughly tramp it with my feet to make it firm, and seldom lose a tree. The after culture would be, clean, thoroughly cultivate up to about first of August. In our section I find nearly all the cherry trees have no fertilizer ever applied to them. We have cherries in favorable seasons, but the majority of them are wormy, knotty and of very inferior size. The culture and high fertilization is the main requisite for successful cherry growing. I might cite the experience with a small orchard I have had. When I had the management of it I gave a thorough cultivation, a few good sprayings, and I have sold bushels, and think customers never have found a wormy cherry. These were mostly Montmorency. Now since the orchard is sodded over and they get no sprayings, we find it difficult to get perfect cherries. They are not as large in size and are very wormy. Another trouble we have to contend with is the rot, especially in a wet season, when nearly half the crop will rot inside of two or three days. We have a home market that will take all the cherries and more than we have been able to supply, but of course they have to be marketed very quickly after picking, and we have to have our customers ready for them before we pick them.

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In regard to varieties, I find that the Early Richmond, Montmorency and Late Morellos are the best in our section. May Duke is grown some but it comes very early and the birds get most of them, and we have had trouble in selling them on account of people not being ready to use them at that season. Of course we have not the city market—it would be different. The Late Morello is the English Morello. I find you get more benefit from the discussions, and merely want to open the subject.

Mr. Burris: Does Mr. Grossman have trouble with trees sprouting very much after they get considerable size, and what time and how much cultivation is given a good sized tree?

Mr. Grossman: My experience has been limited. These trees were young when I had charge of them, and are twelve years old now. A few of them are sprouting around the bottom now.

Mr. Hobbs: If the cherry is on Mahaleb stock, they will not sprout. They will sprout around the collar, but not away from the tree. When planted deep so that roots from the bud from the variety you are growing form, then you will be troubled with surface sprouts.

Mr. Henby: My experience is somewhat limited, although I have paid considerable attention to the growth and habit of the cherry. My experience with the cherry is in planting in first place, that while ninety-nine per cent. one year old trees planted in the nursery row or in the orchard will live, that forty per cent. two and three year olds, under the same conditions, will die. Further, it is a tree that ought not to be planted deep. We plant it shallow. He recommended sandy and tolerably low land. That we can not all have, but in a clay soil, I think shallow planting is the best for the cherry, as it is not naturally a deep rooter, and it makes a hardier and longer lived tree, and you also avoid danger of sprouting when planted shallow. The cultivated stock, that is, if planted deep, will sprout from the roots and in a short time you will have a thicket of cherry sprouts. The Mahaleb does not sprout from its own root.

Mr. Custer: Some twenty-five or thirty years ago I set out an orchard of one hundred and fifty trees, most on Mahaleb stock, and as long as they were on Mahaleb stock they did not send up any

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sprouts, but some were set deep and on their own roots, and what I have now are nearly all on their own roots. I think they are much healthier and longer lived than on Mahaleb stock. Nearly all the Mahalebs have passed away long ago.

Mr. Campbell: My experience in setting trees is limted, but I seldom fail in having a tree to grow if I set it myself, with the exception of the cherry tree; I can not get them to grow, about half of them die. I have laid the blame on the nurserymen. Every cherry tree I have ever bought from the nursery, the roots have been terribly mutilated. Why do nurserymen mutilate the roots when taking up these trees more so than any other trees? Will some nurseryman present tell me why they do so?

Mr. Hobbs: Mr. Campbell does not approve of the method of pruning, where they take all the roots off and start with main cuttings.

Mr. Campbell: In setting cherry trees I have always aimed to set them about as they were in the nursery. Whether I am right in that I do not know.

Mr. Hobbs: My observation and experience in handling and transplanting the cherry is that it is the most sensitive tree that I know, after buds of the cherry have expanded. If planted when dormant, and in good condition every one ought to grow. I think Mr. Henby has well said that you will succeed in getting a better stand in planting one year old trees.

Mr. Shoemaker: What is the Mahaleb and Myrobolan and what varieties are grafted on Myrobolan and Mahaleb? What is the rule?

Mr. Hobbs: Myrobolan plum stock is a native of Persia and it is one of the varieties of plum that does not sprout from the root. Little tender here, that is, trees are not as hardy as ordinary varieties of plums in regard to cold winter killing. It makes a pretty good stock for working plum on, that is, for European and native varieties, and Japans take fairly well to this stock, but on account of the fact that it does not sprout from the roots, it makes a very desirable stock to work plum on. Mahaleb stock came from Persia originally and is a little more tender than our common cultivated varieties of cherries. Trees when young and thrifty will not stand

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as much cold as Montmorency. It is used for working Morello almost exclusively. Sweet cherries used principally on Mazzard stock. Mazzard and Mahaleb are varieties of plum.

Mr. Swaim: This last year I had a discouraging experience with my English Morello cherries. There was a very small worm affected them, a maggot. There was little or no sign of anything wrong until you opened the cherry. I would like to know what remedy there is, if any, for that. They work in them when nearly ripe.

Professor Troop: I do not know what it can be unless it is plum curculio. Plum curculio is the one that usually makes wormy cherries. I do not think of any other that I have had any experience with.

Professor Beach: I am sorry to say we have that trouble and it is just now most serious to cherry growing in New York State. One of the most extensive cherry orchards near Geneva, of Montmorency and Morello, the fruit was not touched this year at all on account of this trouble. The insect is the larva of a fly and the fly punctures the skin of the fruit as it ripens and pushes its egg into the fruit, and as the gentleman has said, the fruit may show on the outside no sign of being wormy at all but it is full of little maggots or fruit flies. We have had it only about three years and know of no remedy for it.

Mr. Stout: I have been bothered with that in English Morello for three or four years. Two years ago I sprayed with strong solution of Paris green when near full bloom, and that year the fruit was fair, but I diminished the yield by spraying at that time, this year we had a good crop without spraying.

Mrs. Royer: For two years we were troubled with that, sometimes there would be as high as three in a cherry, very small. In all our crop of cherries we did not get scarcely a cherry that was fit to use. This year I sprayed them about the time they were as large as a small pea with a pretty strong Bordeaux mixture and that stayed on them all summer. This year we had scarcely a wormy cherry, and we had an abundance of them. Never had any more on the tree than we had this year, and they were of a very fine quality. Whether the spraying did it or not I do not know.

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Mr. Swaim: Spraying did not prevent it in my case as I used Bordeaux pretty strong.

Professor Beach: The insect does not deposit the egg until fruit is ripening. I can not see how we can avoid the attacks of this fruit fly by spraying because it is a fly that alights on the fruit when it is ripening and punctures the skin. The early ripening cherries are attacked as well as late. I can not tell you whether there is a difference in varieties. They are bad on English Morello.

Mr. Henby: The Montmorency, which is a medium late cherry, is more free from this insect than any other cherry we grow. We grow Early May, Montmorency and English Morello. We had better success with our Montmorency than any other sour cherry we grow, freer from attack of this insect.

Mr. Kingsbury: There is a pest called rigolosus that is very troublesome in boring into limbs of cherry trees, especially small limbs, and causing sap to ooze out in the form of gum. On some of my trees, last summer, the gum would extend from the joint where the limb joins the tree to a yard or more up towards the end, but did not seem to affect maturing fruit very much. Does it not do that sometimes and kill trees, and is there not some remedy?

Professor Troop: It will kill trees, and has killed a great many. It does not confine itself to the cherry, you will find it in nearly all the fruit trees. Perhaps apple is as free as any of our cultivated trees, but cherry, plum and peach are especially suited to it. In these fruits where the gum exudes where bark is injured, it is a difficult matter to do very much with it. A little beetle about as big as a pin-head bores holes through the bark, the female lays an egg in the hole and the larva feeds on the inner bark and sap wood. If enough of them are there, in time they will cut off circulation completely and kill the whole tree. Where gum does not exude I have succeeded in stopping them by using strong kerosene emulsion with force pump early in the season when they first begin to start. Use a solid stream or coarse spray. If the tree is badly infested it ought to be cut down and burned.

Mr. Hobbs: Where whale oil soap is kept on trees, they are not nearly as badly infested as when not sprayed with some sort of soap mixture.

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Mr. Tilson: For two years I had four trees of these cherries. The worms were in them so bad we could not use them, and I tried spraying them with all the spraying stuff I could read about, but did not do any good. Last year I got a moth trap and set it under the trees, and kept it there, and this year I did not find a worm in any of these cherries. I caught everything, from the pumpkin bug down to the mosquito, by the thousands. One morning I took out over half a bushel of these black bugs that lay eggs for the grub worm. I got everything. I am going to light the trap and set it early in the spring again.

Mr. Flick: I have heard of this cherry worm this year in three parts of the State, in the eastern part especially, where it had done considerable damage. One gentleman said next year he was going to prevent the fly from getting at his fruit by putting mosquito netting over the top of the tree. Those who tried spraying had not succeeded in preventing the fruit from being injured.

Mr. Swaim: Is it not possible in Mr. Tilson's case that the fumes of the burning kerosene had as much to do as the moth trap?

Professor Troop: I do not want this moth catcher business to go on record as it is left now, because some of you may go home and send for a moth catcher next spring. I have had it for two years, have had it in cherry trees, and in apple trees for the codling moth, and as Mr. Tilson says, we did catch lots of insects, some beetles, a few cut worm moth, lots of beneficial insects. We did not catch a single codling moth, and did not catch a single curculio. We caught a greater number of beneficial insects than any other. I think we did more harm than good with these moth catchers by catching more beneficial insects than injurious ones. A great many have tried moth catchers, and they get an unlimited number of insects, and they jump to the conclusion that it is a great thing, but they do not know what they are catching.

Mr. Henby: I see that the moth catcher has failed to catch the Professor.

Mr. Henry: I want to remark that the season had a great deal to do with this gentleman's spraying material and Mr. Tilson's bug catcher. I believe this is the best season we have had with reference to good fruit without spraying. I have quite a number of

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Alexander peaches, have sprayed them several times and had a fine lot of remarkable peaches. I have a number of plum trees, and have sprayed several years, this year did not spray at all, and had fine plums, so I think the season had a great deal to do with it.

President Hobbs: We will now hear Mr. Flick on "Lessons from the Orchard in Seasons of Drought."

LESSONS FROM THE ORCHARD IN SEASONS OF DROUGHT.

W. B. FLICK, LAWRENCE.

All those who depend for a livelihood on the cultivation of the soil have learned one great lesson, and that is, how helpless is man when contending against the elements. He seems to be the creature of circumstances, largely depending on the weather. He may manure, prepare the soil, plant and cultivate to the highest degree of perfection, and still, unless favorable conditions of weather accompany his efforts, his crops are failures. God gives the increase. I do not want to be understood as discouraging man's efforts or advocating a do-nothing policy in the face of these calamities. I believe that much can be done to lessen the effects of extreme weather conditions. But we have much to learn. The drought of last summer was the most intense if not the longest in duration that we have had here. Never before have I seen the leaves scorched as during this period. Two pear trees on my grounds looked as if a hot flame had played through their branches. The leaves turned black and crumbled into dust between the fingers. Also some grape vines were similarly affected. All these, after rains come, put out new foliage. The effect on some trees was not noticeable at all. They were green and glossy throughout the summer. Some were found on ridges of rolling land and others in hollows. Some were in the cultivated orchards, while others grew in the grass. So that elevation or cultivation, I judge, have nothing to do with the difference in effect; but I think that on account of favorable conditions the root system of some trees went deeper down than others, thereby enabling them to draw moisture from the deeper subsoil. In orchards which came under my observation the fruit began early to drop and continued so throughout the season. This fallen fruit was not caused by the codling worm altogether, for no markings were found on them until about the middle of August, and therefore we concluded that it was mostly caused by the drought.

At picking time from one-half to two-thirds of the fruit had fallen, but the remaining specimens were large, smooth and highly colored—effect

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of thinning. It will pay to thin apples, it seems, especially so in dry seasons. I have found it so in peaches, plums and pears, and am convinced by this season's lesson that it will pay with apples. The effect of the drought on the foliage of unsprayed trees was noticeable in that the leaves fell early, while the sprayed trees retained their foliage until heavy frost. The growth of most trees was meager.

How to most effectually prevent the effect of drought is an open question with me. With small fruits—berries and bush fruits—there is some chance for irrigation, even here in parts of our State, and at a profit; but with the orchard it is hardly practicable.

The most that can be done is to keep the orchard in a healthy condition. Give the trees plenty of plant food, keep the foliage and the wood free from disease and injurious insects, encourage the root system to go deep into the soil by underdraining and cultivation and do not allow the trees to overbear.

Mr. Burris: It seems to me Mr. Flick has pretty well covered the ground as to conditions existing during the past year, and they are not unlike those of my own experience, and a few things I noticed in the past year I have not noticed in previous years in regard to fruit. Early varieties of fruits it seemed to me were much longer ripening than any previous year. Chenango and Maiden Blush apples seemed to extend the period of ripening nearly two weeks, and another thing occurred, rotting of earlier ripening peaches which does not usually occur during dry weather so much as during heated, moist weather. No unusual conditions with other fruit excepting Elberta peaches. Other fruit ripened very well except Elbertas, they were much more sour than usual. My orchard is of twenty years' growth, and is cultivated only occasionally. It was cultivated year before last slightly, and sown to rye and clover and in winter pastured with pigs. Cold damp weather caused dropping of fruit so there was not an enormous crop of apples by any means. As long as I have had a larger crop than many of my neighbors I though myself fortunate in that direction.

Mr. Swaim: Mr. Burris stated that Mr. Flick had covered the ground and he proceeded to cover it over again and I am expected to get out of the discussion what is left. There is one point which they did not touch on however. That has been a very severe lesson to a great many the past season. The conditions with us all throughout the State has been very much the same in regard to

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the drought. That is the drought affecting newly set trees. My observation has been that where they were not given the very best of care and cultivation or mulched thoroughly, newly set trees have made but very little growth, and a great many have died. That is serious to one starting an orchard because a good start in life is worth as much to the tree as it is to the man. The effect on the growing fruit has been given correctly. The fruit failed to mature as it promised. I think where the orchards were not cared for it was worse than where they were. It affected the fruit worse. I know it did in my own orchard.

Professor Troop: When I put this on the program I had in mind a statement that I heard somebody make—I think he is in the audience or was this afternoon—that he did not care whether it rained from the time he planted corn until he harvested it, he could raise a good crop of corn all the same. I wondered if he could do that with corn if we could not do it with fruit. Here is one point that comes in here in the thinning of fruit in a dry season such as we have had in the past year. Is it not especially desirable to thin fruit especially where trees are heavily loaded? Maturing fruit requires an immense amount of water, and especially such a season as we have had the fruit ought to be thinned. There are some thoughts along that line I would like to hear discussed.

Mr. Howell: I have three small orchards, two of them just in bearing, one been bearing for several years. Four years ago last spring the oldest of the orchards I plowed and planted to corn and never since then have the trees done any good. Trees have been planted twenty years. Before plowed they bore abundantly. I did not spray. I think plowing disturbed the roots to such an extent that it has never been worth anything. In the other orchard I have done no plowing at all. When an orchard is left several years without any cultivation the roots come close to surface, and it is dangerous to plow deep. I plowed six inches deep.

Mr. Little: It looks reasonable that if you cultivate an orchard you will have fruit, but after it has stood without cultivation for some time I believe it is better to leave it as it is than to plow it up.

Professor Beach: There is no question about peaches. I believe if anyone expects to do anything with peaches, he should

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cultivate thoroughly. Also large plum orchards. It is pretty safe to follow the experience of the men who are doing the work. In regard to apple orchards, however, we strike a little different condition of affairs, for the reason that the apple in New York State is grown very largely upon farms where the apple orchard is but a part of the farm. The old idea we got from our forefathers was to use it as a pasture as much as possible, and if we got a crop of apples we were so much ahead; but since spraying has come into use so that we can control enemies to the apple crops more than we used to, we can insure to a greater extent a good crop, and are not so much at the mercy of the moth. You know our best apple growers all practice the cultivating of apple orchards. There is still some difference of opinion in regard to it, but sentiment seems to be growing very rapidly in apple sections of the State in favor of cultivation, not that we get so highly colored fruit because we do not, nor that it keeps so well, because it does not, but we get it more regularly and more abundantly than where the orchard is pastured by sheep or in the usual way. Orchards that I am speaking of now were orchards planted along about 1860 to 1865. I have in mind just at this moment the belt of apple country extending along the south shore of Lake Ontario and back of that, including some of the best apple growing country. Two years ago I was driving through a township where they ship 275,000 barrels of apples from one station. Sentiment through that section is for cultivation. Another orchard I visited this year, south of Syracuse, in different soil, on the northern slope of rather a high hill on which the shale crops out, there is an orchard of 1,200 trees, Mr. Hitchens', who is working out the problem that he had to contend with according to his own condition, goes right in the face of all the public advice given, and is keeping the orchard in sod. He does not trim a tree when he sets it, but sets it just as it comes from the nursery—digs a hole in the sod and plants without trimming. Trees are young, although he has in one corner, trees one hundred years old, and they had a good crop of fruit, Baldwin, Greening and some old-time favorites. He mulches about six inches deep and does not cultivate. Mows with mowing machine and rakes the stuff up and puts it around the trees, spreading it out, and he is getting wonderful results. He had Northern Spy trees six and seven years old with good crops of fruit. Has trees planted eleven years

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that have borne every year for the last five years. He has 1,200 trees, but some are not in bearing yet. He sold $1,200 worth of fruit. I believe fruit will become higher colored in sod. Mr. Hitchens is located on northern slope. His method would not apply throughout western New York. I would advise very shallow plowing at first in an old orchard, and working the surface. I believe, for most of our people, cultivation will give more fruit year after year than without. Northern Spy on cultivated land, the same tree set at same time, the fruit will not be as highly colored as on sod. Professor Caul has been studying when the fruit buds are formed. He takes the buds all along during the summer and makes microscopic investigation of them to see when the blossom buds start for next year's crop. With the apple as early as the first of July he gets the first signs of development of the fruit bud during the season. It seems we can theorize from that that if the fruit bud is forming the latter part of June, and then develops through August, it is wise to keep the tree in good growing condition. That is the way I account for more fruit under cultivation, because we keep a good supply of plant food there to fill up those buds during the growing season.

Mr. Stevens: What kind of sod is in this orchard, and is there any artificial fertilization, or are the trees cultivated around them?

Professor Beach: No, they keep enough mulch there to nearly kill out sod. The sod is ordinary June grass, Kentucky blue grass, anything that will grow there. They keep the mulch around them and as the tree grows larger they spread the mulch to suit. They are now trying to grow mulch on other parts of the farm. On some trees they used coarse manure, but not very much.

Mr. Shoemaker: How far apart are the trees?

Professor Beach: On the slope your will find little ridges, and he likes to put the trees in the hollows as much as possible, as there is more moisture and he will get the benefit of it. He runs the rows at a certain distance apart parallel with the side of the hill; perhaps twenty or twenty-four feet apart. He does not grow the trees closely. He is original. I can not tell you the number of trees in bearing, but it is surprising to see how he has the land covered with trees eleven years old that will bring in so much money.

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Mr. Stevens: Do you think it would be advisable to grow pear orchards as you would an apple orchard in this way?

Professor Beach: When you come to the question of cultivating the pear, not taking into consideration the effect it may have on blight, I believe as we get a better grade of corn by cultivating, so we get a better grade of fruit by cultivating. I do not mean by cultivating that we are not to do it the right way. We can do injury by going into the orchard and breaking roots too much, but the kind of cultivating I had in mind then, was keeping the surface broken for two or three inches so as to prevent evaporation of moisture from the soil. Mulching is not as cheap. I believe the cheapest way of mulching would be the dust mulch.

Mr. Little: In regard to early bearing of trees, it is not generally understood that trees like Northern Spy, that cluster up in growing, will come much earlier into bearing when not pruned as when pruned out. If you thin out the head of the tree you simply force the growth on the extremity of the tree.

Mr. Shoemaker: What about the methods of cultivating orchard? The general method here is with two-horse plow, which is dangerous to the roots and bodies of trees, and I would like to hear how you start cultivation in the spring. It is easy to cultivate two inches deep with a spring-tooth harrow, but how do you start it to get it in shape to use spring-tooth harrow?

Professor Beach: If the sod is not too heavy you can turn it under more rapidly with a gang plow. The gang plow is an orchard plow made with small plows set one following another. The question of use of tools is one which varies according to soil. If you have not a mellow, loam soil, use tools for clay soil. Our soil has a tendency to clay and we plow with a gang plow and follow with a harrow or cut-away, our object being, after we turn under the growth left over, to keep the surface mellow.

Mr. Hobbs: What is the best winter protection?

Professor Beach: With peaches there is a tendency towards something that will die in winter, like oats or buckwheat. I use buckwheat a great deal. I have mixed buckwheat and Canada peas, and I always find mellow soil after buckwheat. Crimson clover makes an excellent fall growth. Some seasons the growth is too

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small. The advantage you have with the Canada peas or buckwheat is a larger growth. I have used quite a good deal of winter rye, and that makes a good growth. I usually sow a clover crop first of August. My intention is to keep the surface level during the season. I like to throw the furrows towards the trees.

Mr. ————: Do you plow around each row or do you throw dirt to one row and away from another?

Professor Beach: I plow towards the tree on both sides of the tree and throw furrow towards the tree, and in spring throw it back. In the fall plow the latter part of October or November to keep the surface water away from trees. I do not plow the whole surface.

Mr. Flick: We always cultivate young trees until they begin to bear, then I would continue according to circumstances, as Professor Beach has said, work out your own problem from experience with what you have to deal with. The different parts of the State, different locations of orchards, different soils, etc., require different treatment.

Mr. Barr: In regard to cultivation, I have found the disc harrow one of the best things I have ever used. I have never used what is called the weeder and such things as that, but in place of breaking my ground with a breaking plow, I use a disc harrow and cut the orchard one way as close to the tree as I can with disc harrow, and in two weeks cut it the other way with my disc harrow, and in this way I catch almost all the surface and work it with the disc harrow. After that I simply use a harrow; a spring-tooth harrow is very good. I do not believe in cultivating very deep. One reason for using a disc harrow, if you strike a root, instead of going around it, your harrow will climb right over it, and you never cut a root of very much size with a disc harrow. After I cut the ground both ways I use a common harrow for the balance of the cultivation.

Mr. Garretson: In regard to mulching, I have practiced mulching with a few trees, and this year I found I had an abundance of apple tree plant lice under these trees, and wondered if that was the cause. Where I cultivated there was not one-fourth as much root aphis and plant louse.

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Mr. Hobbs: One objection to use of mulch is that it induces root rot. Whether true or not remains to be proven. Mr. Burton has thought possibly he might have introduced root rot in this way, and he has suffered very much from it. Of course mulch induces roots to form near the surface of the ground. If you commence mulching you have to keep it up.

EVENING SESSION.

Thursday, December 5, 7:30 P. M.

Mr. Hobbs: We will now have the pleasure of listening to a paper by Prof. Wm. Stuart, of Purdue University.

AGRICULTURAL FAIRS AS EDUCATORS—SOME SUGGESTIONS FOR IMPROVEMENT.

BY WILLIAM STUART.

That our agricultural fairs should be educative I think none will deny. It is probably fair to assert that the majority of those who attend the fairs do so for the purpose of acquiring information along lines in which they are interested. Should they be breeders of fine animals, the live stock barns and show ring will naturally attract them. The horticulturist will be attracted by the fruit and vegetable displays, etc.

The amount of information to be derived from an agricultural fair depends largely upon two factors, the quality of the exhibits and the intelligence displayed in their arrangement. With reference to the first factor, quality, no exhibit should be made unless it represented some advance over the ordinary average product of the farm, home or factory. All exhibits should be properly named and products of the same kind grouped together. In this way those wishing to study the exhibit of a certain product may do so in much less time and to much better advantage. The suggestions for the improvement of the agricultural fairs that I am about to make are wholly along the lines I have just mentioned. They were brought to my attention last fall when, as a visitor at both county and State fair, I attempted to make a study of a certain class of exhibits in which I was particularly interested. It is hardly necessary for me to say that they were horticultural exhibits. At the county fair I did not find above half a dozen exhibits of either fruit or vegetables that were named; in fact, there was little to indicate what the exhibit was. If one found certain exhibits of merit there, unless he was able to identify

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the variety of fruit or vegetable, the information that exhibit conveyed was of little practical value. Hence, from an educational standpoint, it was a failure.

While this example may not be a true picture of the average county fair, it nevertheless illustrates the need of greater care in making exhibits. At the State fair, as one would naturally expect, the exhibits were found to be much more generally named. This was especially true of the fruit exhibits, in which no awards are made except in the case of seedling varieties, to any plates not correctly named. In the vegetable department, however, it would seem to the writer that there is still ample room for improvement. In too many instances it was found that exhibits were not named. As an illustration of this a few examples are cited from last year's premium list: "Twelve best cucumbers," "Six cauliflowers," "Twelve ears early sweet corn," "Twelve ears late sweet corn," "Half peck garden peas (dry)," "Best peck purple tomatoes," "Best peck red tomatoes," "Six largest and best nutmeg melons," "Six largest and best muskmelons," "Six carrots for table use." "Six carrots for live stock," etc. The above examples, selected at random from the premium list; it seems to me, furnish sufficient evidence that these exhibits, while they may be of the best, are not educative, in the highest sense at least, because the varieties exhibited are not named. To remedy this defect does not necessarily mean any material increase in the premium list; nor, for that matter, any great change in it. Supposing that instead of saying "Twelve best cucumbers" it said "Twelve best cucumbers, any variety, properly named;" or, if desired, it might be included in the rules that all exhibits should be named, in which case it would read, "Twelve best cucumbers, any variety." We can readily see how much more instructive an exhibit would be to all, and especially to one desirous of increasing his stock of knowledge along these lines. It would be more than likely that a number of different varieties would be competing for the same premium and in this way one would be able to judge of the good and bad qualities of each.

Another matter to which I wish to call your attention is that of the arrangement of the exhibits. Under the present system of management each exhibitor, at least in the vegetable department, stages his exhibit of possibly two or more dozen varieties or kinds of vegetables in a certain bench space which has been allotted to him. In this way exhibits of the same class of vegetables are scattered all over the hall among the collective exhibits of the different individual exhibitors. As a result, if one wishes to study the exhibit in any particular class of vegetables he has to wander all over the building in order to do it, or else he has to wait at the judge's table while they are being judged, which is not always feasible to do. To remedy this defect I would suggest that each class of

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exhibits be staged together, even though it might necessitate some changes in the interior arrangement of the hall. With such a system of arranging exhibits, the displays would be not only more attractive, but they would also be much more instructive.

In regard to the display of fruits there is little to be desired. All exhibits, other than seedlings, are required to be properly named in order to compete for a premium. In the individual plate exhibits the varieties are grouped together, readily permitting one to make a fairly careful study of the individual and collective exhibits. It, however, occurs to me that in the case of apples and pears if it were possible to divide the individual plate exhibits of varieties into sections, putting all early or summer fruits into one section, fall fruits in another, and the winter fruits in a third section, having each section properly placarded, it would add not a little to the instructiveness of the exhibit as a whole. I am well aware that this would involve considerable work on the part of the superintendent of this department and that in a number of instances our textbooks could not be strictly adhered to, otherwise we would have summer fruits in the fall section, and fall fruits in the winter section. I believe, however, that on the whole such an arrangement would prove a very desirable one, and would not only be greatly appreciated by the general public, but would be very instructive as well. I might also suggest that narrower tables would permit of a closer inspection of the fruit.

To those who are interested in the exhibits of plants and cut flowers it is often disappointing to find a handsome plant without a label bearing its proper name, or a handsome vase of roses or carnations without a name. While to some these may appear to be matters of small importance, yet to others they are of prime interest.

Having considered some of what appear to be the salient features which might be improved, our next consideration is how may these changes be brought about. I believe that it lies with this society to take the initiative in the matter. I would urge that we take it under consideration and after having formulated such resolutions as we deem wisest and best, submit them to the officers of the State Board of Agriculture, and also to those of our county agricultural societies. In this way the attention of these officers would be called to the fact that there is a demand on the part of the members of this society that the "agricultural fair" be made as instructive as possible to the general public.

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Mr. Burton: I believe Professor Stuart's criticism on the exhibits were not of the Horticultural Hall scarcely at all. A few suggestions he offered to our department in the hall could scarcely be applied. We could place apples where they belong, but to exhibit them that way we could only exhibit them on individual plates. It could not apply to the general exhibit.

Professor Stuart: That is what I had in mind. I do not think it could apply to general exhibits.

Mr. Flick: I think his criticism with regard to arrangement of tables is a verv good one, as those who are familiar with the tables for exhibition know that some of the fruit is so that no one can examine it very closely only that near the edge. The tables are six or eight feet wide, and fruit in the center of the table can not be examined, or names read. Last year we had large cards with names that could be seen from each side. It seems to me the exhibit tables and shelves around the hall might be much improved. I am glad that this has come up, and I hope the Society will do what it can to have these things improved. I would like to see more light and ventilation in our hall. Sometimes there is too much light and sometimes scarcely light enough to distinguish varieties of fruit.

Mr. Hobbs: In the matter of naming fruits, it has been the practice of this Society to appoint a committee that should precede the expert judge, correctly naming the varieties as they understood them; this has facilitated work very much and increased the value of the exhibit from an educational standpoint. The past season this Society did not appoint a committee, and there were a great many improperly named varieties on exhibition. I am not sure but that this Society ought to see that the expenses are paid and the matter attended to. The State Board ought to look after this properly on its own account, but if it does not, it is to the interest of the Horticultural Society to look after that matter.

Mr. Tilson: I have thought several times that this idea of naming the articles, especially in the agricultural, horticultural and vegetable halls ought to be done. At the State Fair there are thirty or forty premiums given on potatoes. When we go to see

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those potatoes we want to know what they are. If you ask the exhibitor, very often he can't tell you or give you the right name. It is the same way with squashes. I wanted to get a certain variety and could not find it. The name of every squash, new or old, ought to be put on it, so all can see it. Names ought to be on pumpkins, squashes and potatoes especially. With corn it does not make so much difference. The boys of Johnson County make the biggest show of corn in this country, and it is always the same old corn. There are new varieties of fruit coming on all the time, and I am decidedly in favor of presenting some kind of resolution to the State Board because they usually think we have not control or jurisdiction perhaps of anything except fruit and apples. We as a State Horticultural Society have entirely ignored that. We ought to pay more attention to it.

Mr. Stevens: I think we are all of this opinion, and in order that we may have this matter properly arranged at next State Fair, I move you the President and Secretary take this matter in hand and meet with and confer with the State Board of Agriculture at the February meeting when they arrange a premium list, and carry out the suggestions of the Society on this line. I think we all know the importance of having these things named as a matter of education, and I think the State Board would be glad to adopt any suggestions from this Society, and for that reason I make motion that the President and Secretary take this matter in hand.

Motion seconded by Mr. Swaim.

Mr. Burton: It seems to me Professor Stuart ought to be on this as he was the author of it. Include him with the President and Secretary.

Professor Troop: I have been wondering, if the vegetable belongs to horticulture, why the vegetables, excepting perhaps potatoes, which might be classed as field crop, should not be exhibited in Horticultural Hall instead of in the Agricultural Hall. Why could not we fill up the rest of that hall, as it is never full of fruit; and why could not some vegetables take the place of fakirs that are placed around in different places in Horticultural Hall? It seems to me that it would be very appropriate to have the vegetables in Horticultural Hall, squashes, cucumbers, and those usually classed

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among vegetables. Perhaps potatoes would be all right in Agricultural Hall, and it seems to me they could be put over there and under the charge of the Superintendent of that department.

Mr. Burton: It don't seem to me that the Jonathan ought to be placed with squashes. Do not think it would be proper to put apples and potatoes together.

Mr. Milhouse: I like the idea of naming the vegetables and all the exhibits in the hall. There is one reason, heretofore a good reason, why the exhibitor could not tell what he had on exhibition. I know whereof I speak from the fact I sold some exhibitors stuff to take to the Fair. We have some hucksters, not producers, not gardeners, who have laid up stock for weeks in cold storage preparing for State Fair. They could not tell what a variety is, and I know they have told people what varieties were, that were absolutely false. They had to have some name, and if you did not know any better you had to believe it. I do not know that you could get a fair exhibit unless peddlers should be ruled out and make the grower the exhibitor.

Professor Troop: A few years ago we drew up the present premium list, requiring all exhibits to be shown by grower and I think it is pretty generally observed now. We used to have the same thing in this department at the State Fair as now, in regard to vegetables. Professional exhibitors would come from other States, go down here to commission houses, buy the best fruit they could get, take it up to the State Fair and rake off the premiums. They do not do it any more. If those who have the other matter in charge would pass that kind of rule and enforce it that would settle them.

Mr. Hobbs: We have with us today a gentleman from the State of New York—one who is connected with the experiment station of that State, and one who is eminently qualified to discuss "The Function of the Experiment Station Horticulturist." I have the pleasure of introducing Prof. S. A. Beach.

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THE FUNCTION OF THE STATION HORTICULTURIST.

BY PROF. S. A. BEACH, GENEVA, N. Y.

The agricultural experiment stations in the United States were called into existence for the express purpose of aiding agriculture. The act of Congress which provides for establishing them clearly declares this and directs that it be done by acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture and by promoting scientific investigation and experiment respecting the principles and applications of agricultural science. The term "agriculture" is here used in the broadest sense, meaning any industry practiced in connection with the cultivation of the soil, and therefore includes horticulture.

How is the object for which these stations were established being fulfilled so far as it pertains to horticulture? This is a subject which concerns seedsmen, nurserymen, gardeners, florists, fruit growers and all others who are engaged in horticultural pursuits, whatever the section of country in which they may be located. Such persons should take an interest in this question for two reasons:

First. That they may get as much direct benefit as possible from the Experiment Stations; and

Second. That they may do whatever they can to increase the efficiency of these stations along horticultural lines, and especially of that particular station which is located within their own State. This does not mean that their interest in the stations should be purely selfish. We believe that horticulturists are as ready as any other class of citizens to support a broad and liberal management of all departments in these institutions. Even were they disposed to favor a narrow and strictly selfish policy towards the other lines of work, they could not afford to do so. "There is that scatters, and yet increases; and there is that withholds more than is meet, but it tends to poverty." In a great many ways horticulture receives aid from research and experiment conducted outside of horticultural departments. If we were to consider broadly what has been done, what is being done and what might well be done for horticulture through experiment station effort it would lead to a discussion of many lines of work besides those which are commonly classed as horticultural. Plant physiology and pathology, mycology, bacteriology, physics, chemistry and other important fields of scientific effort often bear tribute to horticulture. While such a theme could not fail to interest a society of horticulturists such as I now have the honor of addressing, an adequate consideration of it would require more than the allotted time. We therefore propose to confine

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the discussion chiefly to that phase of the relation of experiment stations to horticulture which pertains to the province of the horticultural department or the function of the station horticulturist. In their origin and development in the United States the Agricultural Experiment Stations have been intimately associated with the land grant colleges, often known as "agricultural colleges" but more properly as "colleges of agriculture and mechanic arts." They are in fact a natural and logical outgrowth from this class of colleges. A brief review of their rise may lead to a better appreciation of their present status.

Fifty years ago the young man who went to college for the purpose of training himself for a professional career had the choice of three professions—medicine, law and theology. Those sciences which are most intimately related either to the productive or to the manufacturing industries received comparatively little attention even in the most progressive and best equipped institutions of learning of that day. The remarkable development of the industrial arts in America, the rapid extension and improvement of transportation facilities, the growth of the productive industries attracted in constantly increasing numbers men of intellectual ability. Such men felt the great necessity for some training to fit them for their calling in life other than the classical or so-called liberal education which was all that the existing schools offered. They became impressed with the idea that a knowledge of those sciences which are most closely related to the arts and industries of life would be of immense practical benefit and that in some way young men should be given the opportunity to secure a good training in such kinds of knowledge. So, from various sources, from shops, and factories, and mines, as well as from the farms, there arose a demand for better opportunities for scientific education.

Eventually a few agricultural schools of lower grade than the colleges were started in some of the older States. The first permanent agricultural college was that of Michigan, which opened its doors in 1857. In 1859 both Pennsylvania and Maryland opened schools of agriculture. At this time Senator Morrill was working in Congress to establish by government aid that great system of State agricultural colleges which was to give to the children of American farmers and mechanics in every State and territory of the Union an opportunity to secure a college education and particularly instruction in the sciences underlying agriculture and mechanic arts. The Morrill act providing for the establishment of an agricultural college by Government aid in each State and territory was passed by Congress in 1862, thirty-nine years ago. It appears, therefore, that these colleges form a decidedly modern class of educational institutions.

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In their earlier history most of them offered little instruction in horticulture or none at all. In others the horticultural interests were given into the charge of a professor having some other science as his specialty, usually either that of botany or of entomology. In fact, prior to the passing of the Hatch act horticulture had been given a separate department in but very few of the agricultural colleges.

In establishing courses of instruction in agriculture and horticulture, as well as in other ways which might be mentioned, these colleges entered upon new fields of labor. As one after another of the States took advantage of the liberality of the Government and the agricultural colleges began to be organized it was found that there were no available men of college or university education who had been fitted by special training to take head positions either in the departments of agriculture or of horticulture. Men already trained in their respective sciences could be found to take charge of departments in zoology, botany, physics and chemistry, but professors of agriculture or of horticulture must needs be developed. These men, as might naturally be expected, had many difficulties to contend with, many perplexing problems to face, much to learn and also much to unlearn before their departments were brought up to the efficiency which they have now attained. There was practically nothing by way of precedent to guide them either in organizing or equipping their departments, in mapping out their courses of study or in developing or adapting the methods of instruction best suited to their needs. Of specially prepared text-books there were few or none. High grade technical literature was very meager, and much of the ordinary literature was often full of crudities and more or less unscientific and erroneous. Confronted with such difficulties the first horticulturists of the agricultural colleges set about the task of developing their departments at these institutions upon a sound basis and along practical lines. They soon felt the need of greater knowledge of even the very ordinary and simple things pertaining to horticulture. There were conflicting ideas and theories about propagation, cultivation, pruning and various other horticultural practices. It was desirable to get at the fundamental facts and put them on record for the benefit of others; to know the truth and publish it. In agriculture similar needs also soon came to be recognized. There arose, then, a demand on the part of the agricultural colleges for facilities for experiment and research in ways which might be of practical benefit to agriculture and horticulture. They presented their needs to Congress in such a way as to finally secure the passage of the Hatch act in 1887. Thus it appears, as has already been stated, that the experiment stations in the United States are the natural and logical outgrowth of the agricultural colleges.

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The Hatch act provides for the establishment of an experiment station under the direction of the agricultural college in each State and territory. Agricultural experiment stations had been in existence in Europe some years before 1887 when this act was passed, the first one having been organized in 1851, in Saxony. Before the Hatch act became a law it had already been demonstrated that when properly conducted such experiment stations render lasting benefit to agriculture by means of scientific investigation. In the United States the first experiment station was organized in Connecticut in 1875. Others soon followed, so that at the close of 1886 there were seventeen of them in this country, most of them being under the direction of an agricultural college and some of them receiving State aid. Under the impetus to the experiment station movement which the Hatch act gave, the number increased from seventeen in 1886 to forty-four by the close of 1888, and most of the earlier ones became reorganized under national authority and were thereby put in position to do more efficient work. It thus appears that while the agricultural colleges are modern institutions, the agricultural experiment stations in this country are even more modern. Less than one-third of those which are now in existence in the United States have been in operation fifteen years and the oldest has been organized but twenty-six years.

Difficulties similar to those which attended the organization and development of the horticultural departments in the agricultural colleges were encountered in starting the work in the experiment stations. The demand for men of special training to take up horticultural work at the colleges and experiment stations was greater than the supply. In many instances the work was assigned to men whose specialty was botany or entomology or some other science. In some cases it was given to practical men who had not received special scientific training. In some places it was given to young men who, although they had been educated in an agricultural college, yet because of their very youth were lacking in that technical knowledge and maturity of judgment which is born of years of experience. In most places the position of station horticulturist was given to the one who had previously been the professor of horticulture in the agricultural college.

The way in which the horticultural work of the experiment stations was administered in 1889, which was shortly after most of them were started, as compared with 1901, is of interest in this connection. There were then forty-four stations, now there are fifty-four. Then there were twenty stations which made no provision for horticulture, now there are but five. Then there were but sixteen stations having a separate department for horticulture, now there are thirty-four. Then horticulture was combined in a department with botany in five stations and with ento-

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mology in three stations. Now horticulture is combined in a department with botany in five stations: with botany and entomology in two stations; with entomology in two stations; with biology in two stations; with agriculture in three stations, and with forestry in one station. This comparison makes it apparent that during the last twelve years the provisions for horticultural investigation at the experiment stations have been greatly enlarged.

In considering the question as to how well the stations have been performing their functions the fact should be borne in mind that they have been in existence but few years, and during this time much pioneering has of necessity been done, especially in horticulture. This was naturally to be expected. Difficulties and obstacles peculiar to pioneer conditions beset the work. In spite of these conditions really commendable advances have been made towards accomplishing the end for which the stations were organized. For conformation of this statement consider for a moment one branch only of horticulture, namely that of fruit growing. Mark what changes have been adopted by practical fruit growers during the past twelve years in methods of fighting injurious insects and plant diseases, in use of cover crops and tillage and in other methods of orchard management. Among the agencies by which these new ideas have been brought into common practice the experiment stations must be recognized as having acted a very important part. Other ways in which the stations have been of practical benefit to horticulture might be mentioned, but it is not our purpose at this time to indulge in expressions either of praise or blame. Many mistakes have been made which may be excused on the ground of youth and inexperience. Some good has been accomplished for which we say heartily, "Well done!" But the period of youth is passing away, and with it let there pass also the necessity for excusing youthful errors. The stations have now been established long enough for them to get their bearings and shape their course. Let them inquire more earnestly than ever what functions are most important; what lines of effort promise most valuable results. One of the most important questions which such an inquiry brings up is that of the relation of the experiment station staff to the teaching function of the college or university.

Where the station is under the direction of either an agricultural college or a State university, as most of our experiment stations are, the head of the department of horticultural instruction in the college or university also has charge of the horticultural work of the station. This is not an ideal arrangement. Where the instructor in the college is also the investigator in the experiment station, if either part of the work must be set aside it is natural to expect that the investigation will wait and the instruction receive attention. College classes must be met at an appointed

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time. To meet them properly requires rigid preparation. Thus in meeting his classes and in planning and preparing for them the thought and energy of the teacher tend strongly towards the instructional side of his allotted work. When a man's thought, energies and ambitions are thoroughly absorbed in the one field of effort it must of necessity unfit him to some degree from excelling in the other. Moreover the type of mind which is found in an excellent instructor is generally quite different from that which is peculiarly adapted to and developed by scientific research and experiment. The man who excels as a farmer is seldom one who succeeds equally well as a dealer in farm products. The experimenter strives to bring forth a product. The teacher deals with the product when it is brought forth. One who can rouse students to enthusiastic pursuit of knowledge is a man of different type from the one who naturally delights in digging at problems and searching for truths with patient zeal that the boundaries of human knowledge may be thereby enlarged.

While it is true that the Hatch act directs them to acquire and disseminate useful information, yet the great object for which these stations exist is not that they may assume the functions of educational institutions, but rather to promote scientific investigation for the benefit of agriculture. Dr. Jordan once said, "An experiment station, chiefly as an instrument of popular instruction, is an absurdity." In highly organized society there is division of labor. Let the colleges chiefly instruct. Let the experiment stations chiefly experiment.

Beyond all doubt the instructional functions have thus far absorbed much more of the time and of the energy of station horticulturists and also of the funds assigned to horticulture in experiment stations than have the functions of research and experiment. It becomes clear that the instructional functions are necessary when we consider the ways in which they are exercised, which are chiefly these:

1. Compiling bulletins which do not set forth results of original investigation, as, for exampe, bulletins upon such topics of general interest as "How to manage an apple orchard," or "How to grow mushrooms."

2. Replies to inquiries from persons interested in horticultural pursuits. In an important way the station thus serves its constituency in the capacity of a bureau of information upon horticultural matters.

3. Taking part in farmers' institutes or other agricultural or horticultural meetings.

4. Contributing to periodical or other literature.

5. Conducting illustrative experiments, that is, those which are carried on primarily as object lessons. For example, after it has been demonstrated that the mildew of grapes may be controlled by proper use of fungicides, the horticulturist may test the treatment in some grape growing

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locality, not to discover its value, but to demonstrate to the people the benefits which follow proper treatment and to serve as a text for a popular bulletin on spraying to prevent grape mildew. It has already been shown that the disease may be thus controlled. His object is simply to bring this knowledge to the people and help them to take advantage of it.

While it is conceded that giving instruction in ways like those above mentioned is a legitimate and, in some part, necessary function of the experiment station, yet such efforts should not absorb unduly the energies of the station staff. There is other work to be done. The promotion of scientific investigation is a far more important function because this tends to increase the sum total of human knowledge. By helping to establish fundamental truths it contributes to the permanent prosperity of horticulture. The very name "experiment station" implies that these special institutions were organized chiefly to do such kind of work. We do not underestimate the need for and value of instruction when we insist that the experiment stations have been established to do a special work and in doing that work they exercise their most important functions.

But it is not enough that they investigate and experiment. Different kinds of investigation vary greatly in the value of the results which they give. The demonstrating that potato scab is caused by a fungus parasite, and in finding a practical and efficient means of preventing it, experiment stations have gained knowledge that is worth something to potato growers wherever potato scab is found. In showing that sterilizing the soil by heating it prevents the ravages of certain diseases of lettuce in forcing houses, the stations have discovered something of practical value wherever lettuce is forced. But a test of strawberry varieties results in knowledge of much more restricted application both as to extent of time and of territory. Its application is restricted as to territory because in the next township where different conditions prevail an equally careful test might give different results. It is also restricted as to extent of time in which this knowledge will be of value because the older varieties of strawberries are displaced by newer ones so rapidly that even a strawberry specialist can not keep posted on them all. These illustrations represent well the two classes of investigations referred to. In the one class results are worked for which are limited in application and of temporary value; in the other that knowledge which is sought is of more permanent value and of wider application. Generally results of the former class may be obtained more quickly; those of the latter class may require several years of consecutive experiments upon a single problem. Which kind of work shall the stations do? The decision rests not altogether with the station workers, but also to some extent with the people who are engaged in horticultural industries. The doing of the less important things has

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heretofore frequently been excused by the station workers with the statement that the people are demanding immediate results. When agricultural and horticultural organizations, either through individual members or by representative officials, show a real and friendly interest by asking the station horticulturist every little while, "Well, what new thing have you accomplished?" and when the same query keeps coming in one form or another from trustees of the college or the board of control of the station, from editors of papers and from various other sources more or less influential, it is not strange if the station worker becomes strongly impressed with the idea that the people demand immediate results and that the more frequently something new can be sent forth the better. Where such an idea controls the station worker the lines of work are not so apt to be selected upon the basis of permanent value as upon the prospects of getting immediate results. I do not believe that the people really desire such choice of work by the stations. If taken into confidence by the station workers and shown clearly the comparative merits of the different lines of investigation I believe they would almost unanimously declare in favor of the policy of directing experiment and research patiently and persistently towards learning those truths which are of most permanent value and widespread application. Then instead of asking "What new thing have you done?" the query would be, "What are you trying to do and how are you trying to do it?" Such an inquiry coming from the practical man to the professional horticulturist at once opens the way to cordial and sympathetic relations between the two and they are then in the best position to help each other and to join in forwarding the interests of horticulture.

If the station horticulturist is to perform most effectively the higher functions he must necessarily be relieved from some of the less important ones. What are some of the less necessary functions? One of them is the managing of the land in the horticultural department according to the model farm or model garden idea. It is no light task to manage a model fruit farm successfully. Probably no one has ever done it without laying awake nights. And when it is done it is a model which others can safely follow only so far as they have similar environment for trees and plants and similar market demands, shipping facilities, available labor at similar prices and a thousand and one other things which must be met and dealt with by each individual according to circumstances and his own taste and preferences.

Governor Hord has said that "You can't expect a successful breeder of Shortnorn cattle from a man with the Jersey idea; nor a successful breeder of Clydesdale or Percheron horses from a man pervaded with the thoroughbred idea." In other words, a man will be most successful in

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growing what he has a liking for, either natural or acquired. This is as true of fruit growing and gardening as it is of stock raising. Should the station horticulturist succeed in developing a model farm at the experiment station it would be his model and not yours nor mine, and it would be a model for his conditions and not for yours nor mine; and, worst of all, or, rather, best of all, it would be permeated with his likes and dislikes and not yours nor mine.

There is one feature of the instructional work to which the attention of an audience like this may well be called. The station horticulturist is often asked to give particular and detailed directions about how to grow certain things. He is asked what kind of fertilizers to use for a special crop and in what proportions they should be mixed; how and when to cultivate and to plant and to harvest and a host of questions of like character. It is all right to ask these questions, perhaps, but the inquirer must, after all, work out his own problems according to his peculiar conditions. My apple orchard responds but little to applications of potash, but that may not be true of your orchard. There are general principles bearing upon orchard practice which may be given, but the application of those principles must ultimately rest with the man who can study the local conditions on the spot. Dr. Armsby has forcibly said: "The function of the experiment station is not the impossible task of giving him (the farmer) recipes suited to every conceivable emergency. Its business is to enlarge his knowledge of the natural forces which drive his farm as the steam drives the engine, and to teach him to control them instead of being controlled by them. It is not a device to save the farmer the trouble of thinking. On the contrary, its constant and insistent demand is that he think more. It can help him permanently and effectively only to the extent to which he can by such thinking digest and assimilate its help."

The remarks about variety testing, which were made a little while ago, might perhaps be construed as disparaging the testing of varieties by the experiment stations. It is not my purpose to altogether condemn variety testing as a line of station investigation, but rather to raise the question whether other lines of work do not generally promise more lasting and widespread benefit. Variety testing is especially valuable in some sections of the country and within proper limits it is desirable in other localities. In some of the newer parts of the land the great question is not "Which variety will grow?" but "Will any variety grow?" Thus, if a man in Minnesota desires to grow apples, he can not choose the list of varieties that the fruit grower in Indiana may safely select. He needs apples of the grade of hardiness of the Wealthy. So, also, in some parts of Colorado the question is not what kind of pear to grow, but can any pear be grown under the existing conditions. My opinion is that in the

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older parts of the country, where there is already a good range of standard varieties from which selections may be made, the great need is not so much to learn how well new varieties may succeed, but rather how may the standard sorts be grown and handled more successfully. Isn't it true that we have often tried to overcome mistakes in our ways of doing things by seeking some new variety which would do well in spite of our mistakes? We have read or listened to descriptions of the health and vigor and wonderful productiveness and other desirable, though perhaps impossible qualities, in the new variety and have said to ourselves, "That's just what I need; I'll try some." But insects and disease and thirst and hunger have eventually played havoc with the new variety as they did with the old.

Shall we, then, in the older States give up the search for better things? By no means. There is need of good work in plant breeding, in plant introduction and in variety testing. But we do not need new varieties more than anything else. There are other important lines of work, also. Let us ask, "Which knowledge is worth most? In which field of research and experiment shall the greatest effort be expended?" Then having decided these questions, let the station be encouraged and supported in pursuing its investigations persistently, even if new results can not be announced as frequently as we would desire to have them. Thus understanding each other, believing in and helping each other, the station workers and the people for whom they work will eventually rejoice together in permanent horticultural progress.

Mr. Burton: I am glad Professor Beach has come here and given us such a good paper, and has relieved my mind somewhat about the action of the experiment station. The teacher in these stations is a teacher in experiments. Some things come up in my way in managing the orchard that I thought possibly ought long ago to have been answered by these experiment stations, and I was brought to a standstill until I found these things out myself. The Professor has explained that they are not working along that line, they are teaching what somebody has found out somewhere else, and are getting it in shape to give it to the people. I thank the Professor for the paper and feel more generous toward that class of instructors.

Professor Beach: My desire is that you will all speak your minds freely on this subject. I am willing to take my share of the faults of the experiment station. I know something of the farmers' feeling toward the station. Some do not believe stations are

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doing what they ought to do. A great many others can not help but feel that stations have been some help in the progress made in agriculture and horticulture. They can be of a great deal more help. The way to correct these things is first to recognize what the work of the experiment station is, and see if we can so adjust matters that we can expect an ordinary man with the special training he is given to do this work for us. They are not men who can do twice the work of ordinary men. I am glad that here in Indiana you are working along that line and have Mr. Stuart in the experiment station who does not have teaching to do and who can sit down and watch his experiments all summer and winter if he wants to, and I think all stations in the United States will come more and more to doing work in that way.

Mr. Zion: I would like to ask a question. I have had some experience in experiment stations. Do not these men qualified in connection with universities, resort to artificial means in the way of soil that is away beyond a practical use to ordinary farm or fruit growing? That has destroyed my confidence more than anything else.

Professor Beach: That opens up to my mind one of the objections I have tried to bring out here today, relying too much upon results which are obtained outside of their own farm. Of course I can not say what other growers and horticulturists have done in their tests. The point is, as said of the strawberry business, Professor Troop or myself may contract for sixty or seventy varieties of strawberries, watch their growth through the season, sit down and make out a list and show which one has done the best with him; yet another man, taking the same list of strawberries on another soil in another locality, might get different results with each variety. Simply recognize that different varieties do differently on different soils. The variety test is of some value as it contributes to our knowledge what that variety will do. The kind of work that is going to do the most good is work of more strictly scientific character. For instance, Professor P—k—r of Wisconsin has devised a theory for food in milk. Now he has found something very valuable to milk, the world over, wherever we find milk we can test the food in milk with the Professor's test, and do it quickly. And just the same with treatment of fungus on peach. Every peach sprayed with Bordeaux mixture will insure the crop against that disease

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and will wherever they grow peaches. In one experiment station now they are studying red spot in cheese, spending hundreds of dollars trying to find out what makes red spot in cheese. The past year their efforts in that line have given them such results that they can go into a cheese factory and tell cheese men how to avoid having the red spot in cheese. One of the main points I want to make in this paper is the point to determine what work we should do at these stations. Let us determine the kind of knowledge we are expected to get from it and decide which kind of knowledge promises most far-reaching results. Let us set out with our faces in that direction and keep at it until we get results. I believe as I said in the paper that something ought to be done if we expect to keep the stations. There are certain fundamental things that are practical and that have a claim upon our time and knowledge, which we must meet.

Professor Troop: I am very glad Professor Beach has presented this matter to us in the way he has because I have felt that the people generally did not understand, did not appreciate the amount of work that was expected generally of the station horticulturist and professor of horticulture.

Mr. Milhouse: I am glad to hear the paper which has been read this evening. I learned, long ago, that no man can do experimenting altogether for himself. I can get thoughts from experiments conducted at Purdue and I can carry the idea out on my farm at home. After I get all I can out of the experiment station I have to work part of it out myself. I am recognized as a crank in our community. Some experiments I have made were very successful, and in others I got my fingers burned.

Mr. Tilson: I have visited Purdue I suspect oftener than most of you, and am satisfied with their work in the college, and also the work in the experiment station. I am glad they have another to help there, Mr. Stuart, and I want all of those seeds which are sent out by our Congressman, sent to Purdue and let them experiment on them.

Close of evening session.

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MORNING SESSION.

Friday, December 6, 9 A. M.

Mr. Hobbs: Mr. Burton wishes to make a statement.

Mr. Burton: I wish to speak of the matter of an exhibition of our fruits at the St. Louis Exposition. Our western brothers are doing wonderful things in fruit growing, in apple growing, and we fully believe they can not beat us, and we do not want to stand idly by and make no show at this exhibition. I believe we can make the finest display of the most popular apples in the United States—Jonathan, Winesap and Rome Beauty; and we can exhibit quite a number of varieties. I want to suggest that we ought to prepare for this early next season, and take special pains and make a thorough canvass. Perhaps we should have a committee of ninety-two to look after this business, one from each county. I would like to hear from other members on this.

Mr. Garretson: I think he has spoken to the point, and will work my best in my section.

Mr. Burton: The Secretary should be chairman of this committee and make all arrangements for us and provide for apples to go in cold storage as soon as they are ripe enough.

Mr. Flick: I approve of the suggestion to begin in time so as to be ready to gather up the fruit and put in cold storage. I think we can, as he said, make a very creditable show of apples from Indiana, not only the varieties he mentioned but others, and think it proper and right to do so. Our State needs to be more thoroughly advertised as an apple growing region. I believe that we can grow as good and perhaps better apples than either Illinois, Missouri, Kansas, or any other western State, and here is the best and perhaps the only opportunity we will have for many years to make it known.

Mr. Henby: I heartily endorse the proposition, that we are going to have something to do in an undertaking of that kind. Remember we must run up against Missouri, and she is going to put her best foot foremost. I believe she has the best orchards of apples of any State.

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Professor Troop: I was at the Pan-American Exposition in September and am confident if we had had our exhibit that we had at the State Fair this year, set down there just as it was at the State Fair, we could have equaled anything there was on exhibition there at that time. A good deal of the fruit, a good many apples on exhibition, when I was there, were cold storage apples. New York is an apple growing State, but did not happen to be in it this year, and it may not be Missouri's year two years from now. We ought to begin now and prepare for the St. Louis Exposition, and let people know we can grow apples in Indiana. At every exposition for years there has something come up, either no fruit or no money to do anything with, and we have not been represented, and I think it is time we were represented in some of these expositions.

Mr. Thomas: A year ago last summer Indiana apples took first premium at the Paris Exposition, and we can compete with Missouri and other States by going to work in time, and I am decidedly in favor of going to work and working the matter up, and see if we can not hustle Missouri.

Mr. Campbell: The best way to dispose of this matter is to make a motion, and I move the President appoint a committee of one from each county in the State, as far as he can, to see after this matter. Include the Secretary as chairman of that committee.

Mr. Hobbs: I would suggest that this matter, as it will call for some expenditure of money and involve the Society in a general way, be referred to the Executive Committee, who will have power to act for the Society, and if you will refer this whole matter to the Executive Committee, of which the President and Secretary are a part, it will put it in better shape. If this meets your approval it will satisfy me better.

Mr. Johnson: I heartily agree with all that has been said, and I think the Legislature will be in session between now and that time, and possibly it will do something for us in the way of money, and I am in favor of your suggestion, referring the matter to the Executive Committee or Board of Horticulture.

Mr. Campbell: I accept the amendment to my motion.

The motion and amendment were carried.

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Professor Troop: Since I have been here, I have received the medal that was awarded the Society at the Paris Exposition. It was sent by mistake to Mr. Ragan, and he forwarded it to me. We were awarded a gold medal for the interest this Society took in the Paris Exposition, although the apples that were sent were by private individuals.

Mr. Hobbs: Mr. Johnson, our Treasurer, was not with us, and did not make his report as Treasurer in connection with the Secretary's report, as usual. He is with us this morning and will explain his absence yesterday and make his report to the Society.

Mr. Johnson: I have not been notified of this meeting, and I never heard of its occurrence until about an hour ago. Who is to blame I do not know.

TREASURER'S REPORT

Of Receipts and Expenditures for the Year Ending October 31, 1901.

October 31, 1900.	Balance in the treasury	$351 82
October 31, 1901.	Received from Secretary Troop	120 01
October 31, 1901.	Balance due treasurer	13 13
	Total receipts	$484 96

At the same time there was expended as per vouchers Nos. 1 to 29, inclusive, $484.96.

Respectfully submitted,

SYLVESTER JOHNSON,

Treasurer.

The President appointed Mr. Tilson and Mr. Garretson Committee on Finance.

Mr. Stevens reported on President's address.

Moved and carried that the report of committee be concurred in.

Professor Troop: Would it not be well at this time to fix a time for our annual meeting? A few years ago we thought it would be a good plan to change the time of meeting to January at the same time of other meetings which are held then, but we found it did not work well, and since then it has been left to the Executive Committee to fix the time for meeting, and no one knows until the

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program is out, when we are going to have the annual meeting, and we ought to change the constitution if it needs to be changed, and if not, let's adhere to it.

Mr. Hobbs: I am favorable to a fixed time for holding the meeting. This was a rule for a good many years, but the time for holding the meeting conflicted with that of Michigan and Ohio, and that by holding a little earlier or little later, we might miss their dates and have delegates from their meetings to attend ours; but this matter of fixing date in January and December and at different times seems to unsettle us, as it has Mr. Johnson and many others, and the date should be permanently fixed at some time that will suit the convenience of all. Would like the Society to take this matter up and fix date that we can adhere to in future.

Mr. Johnson: The matter ought to be done right now. It was left to the Executive Committee a year ago. I am told they met and decided to have the meeting at this date instead of the time the constitution fixes—first Wednesday after first Monday in January.

Mr. Hobbs: You remember we made this change when we made an effort to accommodate members on lower rates in getting to city. We passed to hold it during the week when other agricultural societies met here in the city in connection with the State Board, and found a difficulty in getting a convenient place to meet. I think that early in December suits most of our people better than any other time.

Mr. Flick: I would move that section 8 of the by-laws be so amended as to read the "first Wednesday after the first Monday in December." It now reads January.

Mr. Swaim: I support the motion.

Motion carried, and the by-laws were so changed.

Mr. Hobbs: We will now have a report from Mr. Burton, Superintendent of the Experimental Orchard.

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REPORT ON EXPERIMENTAL ORCHARD.

BY THE SUPERINTENDENT, JOE A. BURTON.

The growth of trees in both variety and top worker plots have been good. The seedlings were much retarded by the repeated attacks of the leaf roller. They are now set in rows nine feet wide by three to four feet in row.

There are seedlings from Grimes	50
There are seedlings from Ben Davis	166
There are seedlings from Salome	14
There are seedlings from Rome Beauty	139
There are seedlings from Winesap	444
There are seedlings from Winesap and Grimes mixed	92
There are seedlings from Kansas Keeper	50
There are seedlings from Mann	14

The following seedlings have been top worked:

Winesap	11
Grimes	2
Salome	2
Rome Beauty	10
Ben Davis	10
Genet pollenized by Ben Davis	3
Total number of seedlings	1,007

Lost in top working:

Winesap	6
Rome Beauty	3
Ben Davis	2

The cause of loss was bad grafting wax. On account of the high price of beeswax we substituted a part with paraffine. It was not tenacious and cracked. We have three pedigreed seedlings top worked, Genet pollenized by Ben Davis. We grew about 1,000 pedigreed seeds at a cost of about $30. They were planted November 12.

Rome Beauty pollenized by Ben Davis.
Rome Beauty pollenized by Grimes.
Ben Davis pollenized by Rome Beauty.
Ben Davis pollenized by Grimes.
Winesap pollenized by Rome Beauty.
Winesap pollenized by Grimes.
Winesap pollenized by Ben Davis.

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Grimes pollenized by Benoni.
Grimes pollenized by Grimes.
Benoni pollenized by Chenango.
Benoni pollenized by Early Harvest.
Benoni pollenized by Trenton Early.
Benoni pollenized by Yellow Transparent.
Yellow Transparent pollenized by Benoni.
One lot, identity lost.

We have at our service only a few good varieties to operate on. The coming season we will work mostly for inbred seeds.

Have found the wood veneering a good protection against rabbits, but quite an injury to the trees. It is too close and makes a special harbor for woolly aphis. All will be discarded in the future. A number of important experiments will be inaugurated next season, but will not be noticed until our next report. The orchard cost the society for the year $125.

DISCUSSION.

Mr. Hobbs: State your succcess in crossing Rome Beauty and Winesap.

Mr. Burton: It is quite an idea with me to get a cross between the Rome Beauty and Winesap, and if I could make a thorough cross I would have an ideal apple and ideal tree, but on account of blooming at different times—Winesap first and Rome Beauty later—it is difficult to get pollen. I have never been able to find one particle of Winesap pollen. I have never been able to have a single Winesap set on where I enclose blossoms, either in paper sacks or cloth. Other varieties set on more rapidly where enclosed than when in open air. This season, the Rome Beauty blossomed early, and I succeeded in getting a number of crosses, about 35 apples pollenized by Rome Beauty, and though we have no assurance that crosses will take, we hope they will.

Mr. Hobbs: It will be necessary to appoint a committee to have charge of this work. This committee is appointed annually, and its term of service expires at this meeting.

Professor Troop: The Committee on Experiment Orchard consists of C. M. Hobbs, Jas. Troop and Mrs. Stevens.

Mr. Burton: How long should they serve? It seems it would be well if they were not all changed at once.

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Mr. Tilson: The executive committee could see after that better than we could.

Mr. Hobbs: The orchard is managed by Mr. Burton, who works in harmony with a committee appointed by this Society, committee of three persons.

Mr. Burton: I am a little particular about the committee. I do not want such a strong minded committee that I can not boss them.

Mr. Robinson: If Mr. Burton is satisfied with present committee, I move it be continued.

Motion carried, and committee is reappointed.

Professor Troop: My report as delegate to Pan-American Exposition can be shortened up to suit the time, and I move we hear Mr. Keach now, and then have election of officers before we adjourn for dinner. That will give the new board a chance to have a meeting during the dinner hour, and then we won't be rushed so when we come to adjourn this afternoon.

Moved and carried that we hear Mr. Keach on his subject at this time.

[No copy of this paper was obtained, but a clipping from Orange Judd Farmer is inserted.]

James L. Keach spoke on grading, packing and handling apples. He said that only a limited quantity of apples could formerly be saved, especially of the summer and fall varieties, owing to the glutted markets at picking time, but the advent of cold storage has opened the markets of the world and made practicable the handling of this fruit profitable, making the apple as staple as wheat. Planting of orchards has not kept pace with the increase of population, with the failure of many old orchards. We are now buying most of our apples from beyond the border of our State, while there are thousands of acres of land in the State which could be profitably planted to apples, without danger of overproduction. The climate and soil of the famous Ozark mountain apple region is not superior for growing apples to a large portion of our own State.

A Member: What is the outlook for the planting of commercial apple orchards in Indiana?

Mr. Keach: I know of two pieces of land, of 200 acres each, which are being put out as commercial orchards—one this side of

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Vincennes, the other this side of Bedford, Ind. The people who purchased this land are not farmers, but they are men who are interested in the apple business, and see in the climate, in the soil and in the general situation, a good investment for capital. They are thoroughly practical, and will plant an orchard for its commercial value, not because of any question of preference for one variety over another, or because this variety happens to have a little better flavor, or something of that kind, but it is a question of money making. In all probability these pieces of land will be planted largely to Ben Davis, Winesap, perhaps some York Imperial, Jonathan, a few Rome Beauties, but I think the varieties will run largely to Ben Davis, Winesap and Grimes Golden. There are a number of different varieties that are raised in other States that I believe would bring good results in Indiana, and I base my opinion on that from what I have seen here and there. I have occasionally run across a tree of York Imperial in this State, and I found the product very superior to product of Virginia; they raise largely York Imperial. I think experimenting in new varieties is a field open and worthy of consideration, but my advice in planting an orchard for market is, stick close enough to your principal varieties to have something to sell. In other words, if you have 500 barrels of apples to sell, you should not have 150 different varieties and but three or four barrels of each variety, confine yourself to a few varieties and make it an object to have purchasers hunt your orchard. Those orchards are in demand. There is today in existence what is known as the National Apple Shippers' Association, composed of the principal dealers throughout the United States (two members of this Association are in Indianapolis), and made up of heavy dealers all over the Union. They devote some time and attention to looking up statistics; not only that, but hunting up good orchards, what they consider good orchards, are those that run pretty well to straight varieties. An orchard of that kind is more valuable to them, and they will pay more per barrel than for small orchards, and a saving in expense is material. A fine block of fruit, representing 1,000 to 2,500 barrels, is of sufficient importance to buyers to pay its full value and to put a force of men there to take care of it, but in small, five, ten, twenty and fifty barrel orchards the fruit must be bought low, as expenses are too high to justify paying a very high price.

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This organization of the apple shippers has done some very good work in the line of aiding horticultural societies. They are in very close touch with them in Illinois, Missouri, New York—the large apple growing States—but little consideration has been given to Indiana, as there are so few good orchards. This season, orchards cultivated and properly taken care of—trees sprayed, etc.—produced a good quality and quantity of fruit, but Indiana attracted but little attention from buyers this year, because where one orchard had been sprayed and taken care of, 100 orchards have been neglected, and the product was knotty and undesirable. That is the class of fruit that buyers are not looking for. Owing to scarcity of fruit this year, everything found a market, even very inferior stuff demanded a fairly good price. But to show you the difference between an orchard taken care of and an orchard neglected, I know of one orchard that produces a crop in the neighborhood of 10,000 barrels in Virginia, largely consisting of York Imperial, that sold at auction to the highest bidder. I bid on it myself, and thought pretty liberally too, $2.65 per barrel, but it sold for $3.35 per barrel. The value of the orchard was largely in the fact that they run pretty straight to one variety. There was a block of fruit of sufficient magnitude to enable men to go there and take care of it, packing and putting away for the winter trade. Another thing that has changed somewhat the situation of marketing the crop of apples in Indiana, is the fact that the consumer today makes his purchases different to what they were made fifteen or twenty years ago. Take large cities. The consumer must buy every day, as the average consumer has no storage room outside of his ice box. Wealthier people have no storage room in the cellar, and poorer class of people—a great many—have no cellars; consequently, there is a constant demand throughout the winter, and this must be supplied from day to day, and a crop of apples in Indiana is easily marketed, and represents its face value in dollars and cents, and that value is just as staple as a crop of wheat. It has settled itself down to a basis where there is a fixed price set on apples in the fall of the year, and as the season advances the price changes as the situation justifies, but it is possible to raise and market any sized crop in this State. You hear a great deal about apple growing in Missouri. Their soil or climate is not superior to Indiana. Indiana has the advantage in both soil and climate, because their fruit matures and

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must be picked a little earlier than ours. Our fruit matures about the right time. Ben Davis in this State takes on a very high color, and this season the highest colored apples on market were produced in Indiana. The average color was superior to that of the fruit produced by any other State in the Union. You have marketing facilties in the State of Indiana that are valuable. You are located where you can reach the foreign market, reach London, to much better advantage than those western States, because when you go west of the Mississippi River your freight rate is much higher. In addition to that, you are right in the center of a large population, and you have an outlet to the south, east; you have the north and northwest. You are very fortunate in your location, and if you had apples in sufficient quantity to attract buyers, the prices paid for apples in Indiana would be higher than they were from these more distant points for reasons mentioned.

Mr. Hobbs: On behalf of the Society I wish to thank Mr. Keach for this very valuable paper.

Mr. Shoemaker: Before he leaves I would like to ask some questions.

Mr. Keach: I will be glad to furnish any information I can, as I feel just as much interested in this work as any member of your Society, and on that line want to say this National Association, I mentioned a moment ago, meets along in the summer about first of August, and at their next meeting I will be a little more interested in seeing if I can arrange for their year book for distribution among your membership, as there is a great deal of very valuable information contained in it. They are especially interested in producing good fruit.

Mr. Shoemaker: Regarding different parts of Indiana as to adaptability to raising apples, a few years ago in this Society the matter was discussed and the State was divided in three different classes, northern classed as fruit and apple region, southern as good apple region, while central part was not so regarded, and even they discouraged apple growing in the central part, I would like to know whether it would be advisable to plant apples in the central part of Indiana.

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Mr. Keach: In different parts of the State there is a difference no doubt in soil. In the northern part of the State I have seen as handsome Baldwins, Greenings, Yellow Bellflowers, Maiden Blush and such varieties, as I ever saw anywhere, and they mature late and at proper time. Those same varieties grow well in the southern part of the State, but mature too early before marketable value. I do not think there is a county in the State of Indiana that has proper soil but what is an apple producing county. Do not think the question is so much a question of location in the State as it is proper varieties that will grow and give good results. Take the southern part of the State, it is an established fact that Ben Davis, Winesap, Rome Beauties are good producers as well as Grimes Golden, and there is, I am satisfied, a great opening for the Jonathan apple in the same sections, that is in southern counties. I have found Jonathan apples at various times where the owner did not know the name of the apple. That leads me to believe it would be a good producer, and there is no apple grown to perfection that nets better results, as for instance today we are getting from $4.50 to $5.50 for Jonathan, while Ben Davis is selling from $3.50 to $4.00. When I speak of apples I speak of a No. 1 apple. But any quantity of Ben Davis, from neglected orchards, are selling considerably less than that, from $2.50 to $3.00, as bulk of Indiana crop really is No. 2's, but there are cultivated orchards, sprayed and taken care of, that are the exception. I want to call attention to a question of bitter rot. I suppose a good many are familiar with it. It is getting to be quite a serious question. Any county in Indiana will produce good apples. I have never found a good tree that received good care, when there was a crop in Indiana, but what had a crop.

Mr. Shoemaker: Are those varieties for southern Indiana suitable for the level region of central Indiana?

Mr. Keach: I think they are. A commercial orchard, near this city, owned by Mr. Flick, produces paying crops of good quality, and within the last few years there have been apples, in a small way, grown around Indianapolis, the quality of which was fairly good, and this shows that if they had the trees they would have the fruit. No question about this territory producing the fruit.

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Mr. Shoemaker: If sixty or seventy-five miles away from cold storage, I would like to know about expenses?

Mr. Keach: A man situated sixty or seventy miles away from cold storage and unsettled in fall of year as to proper course to pursue in disposing of his crop, would first take up the question of cold storage and make his arrangement after making his contract for storage. The price for cold storage runs at so much per barrel or so much per season. The usual price is 15 cents per barrel for the first month and 10 cents per barrel for each additional month, or 40 cents for the season. The season rate means you may put your apples in at packing time and may take them out any time between that and first of June, any time you are ready. The cold storage people see to this business. You put yourself in correspondence with them and they will make you a rate; you pack your apples and ship them direct to the cold storage and they send you a warehouse receipt. The apples are yours and never leave your possession at all, and they are at your disposal. You can take the buyer to cold storage and show him your apples at any time. There is some difference made in rates. Contract for your rates. There are three cold storage buildings in Indianapolis, and if one asks too much, go to the other. Price would be for the season, 40 cents, 15 cents per barrel and 10 cents for each additional month. They are ready to take them just as early as shippers are ready to send them in. When packing for cold storage, apples should be picked early, as soon as they have taken on full color, not premature, but not permitted to remain on the tree until they commence to drop. Should be picked full early. The apple passes through various stages of decomposition. Take it before mature and get it into cold storage at once, and there is no telling how long you could keep them.

Mr. Burton: What chance is there for storing our apples for St. Louis Exposition through summer?

Mr. Keach: No trouble at all for you to arrange for cold storage. I do not know how they will arrange exhibit at St. Louis. At the Paris Exposition they had a cold storage room fitted up on the Exposition grounds, and no doubt the same thing will be followed in St. Louis. In selecting apples for the display at St. Louis Exposition you should be careful to get them there in good condition.

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Of course they should be carefully handled. If necessary, send them by express at greater expense; they should be got there in good condition. The package in which they are displayed should be made as attractive as possible, use various sized packages. There is in common use a California bushel box. With highly colored fruit, the bushel box makes a very pretty show, and lying out one side the contents show to good advantage, but in making your display, you should be very careful as to both your package and your packing, and have them as attractive as possible.

Mr. ————: Would you advise putting Wealthy in cold storage for Christmas?

Mr. Keach: No; not for Christmas trade. It is not necessary. Wealthy is a good eating apple, and matures at a time when there are plenty of soft apples, and these early varieties placed in cold storage can be taken out and put on the market in advance of winter apples. Such varieties as Ben Davis, Winesap, and varieties of that kind should not be considered as on the market before January or February. We are marketing Ben Davis now, ourselves, but of quality we have not much regard for. The bulk of my apples this year came from Kansas, and I paid big prices for them and paid high rate of freight, 60 cents per barrel, to get them in here, but wanted quality. As to the question on Wealthy—the Wealthy is a good cold storage apple, and its time for marketing is in advance of others, about Thanksgiving.

Mr. Little: Does the Keiffer pear keep as successfully in cold storage as apples, and how does it handle after it comes out? Is it liable to decay?

Mr. Keach: Dealers differ very materially as to the Keiffer pear. I have but little regard for the Keiffer pear for cold storage. For some reason it seems to turn brown, and the results I have had with Keiffer pears in cold storage have not been very satisfactory. There has been times when the market was in such a condition that I could not dispose of them. Put them in cold storage to prolong life, but results are not satisfactory. They seem to discolor and turn brown.

Mr. Kingsbury: Mr. Keach would be a very valuable member of our Society, and I move that he be made an honorary member of

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our Society. Personally, I feel very grateful to Mr. Keach for this very practical talk along the line we are interested in, and just what we needed at this time. Could this Society become a member of the Apple Shippers' Association you spoke of?

Mr. Keach: No; you could not become a member, but it is their desire to be in as close touch with the various Horticultural Societies as possible, and that is readily explained. Their interests are identical with yours. If no apples are raised they have no business. If their business is to prosper, the apple growing business must prosper, and they are interested in bringing up the quality to as high point as possible, because there is today an export demand for apples that runs up in the neighborhood of 2,000,000 barrels yearly, and as to how much that can be increased, depends largely upon growers of the United States. That can be increased in proportion to quality of fruit they raise and attention they give to raising and handling of it. Markets are open to us, and there is not any such thing as over-production.

Mr. Maish: Have you had any experience in storage of small fruits—strawberry, raspberry, blackberry and grapes?

Mr. Keach: Yes, sir; I have had experience in cold storage with small fruits, strawberries, raspberries, and various berries of tender nature. Cold storage is useless except where a surplus may arrive on a glutted market, or carried over temporarily from day to day, but there would be no object in placing strawberries in cold storage to hold for any length of time. There is no purpose in it and strawberries are something that ripens every day and should be sold every day. As to grapes, the results are very good. Grapes can be held in perfect condition in cold storage with very little shelling, unless held too long. Can hold grapes for fifteen to twenty days, that carries you generally out of the glut. You can hold them fifteen or twenty days with very little shelling. After that they age up and stems mold and grapes shell off.

Mr. Swaim: In regard to other varieties of pears, summer pears, how long can Bartlett be held safely?

Mr. Keach: Bartlett pears raised in vicinity of cold storage, handled carefully, picked at proper time, which is when pear is matured and not when it has remained on the tree until colored, but

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when it has its growth, can be held with every degree of safety for six weeks, and will color up in cold storage and come out in its most desirable condition.

Mr. Swaim: How about keeping quality after taken out?

Mr. Keach: Fruit, such as Bartlett pears, coming out of cold storage is not expected to keep any great length of time, as for instance, when we have in cold storage Bartlett pears, we bring to the house each time what we expect to sell. If weather is warm we bring them in smaller quantities—what we expect to sell in two or three hours. If pears are ripe they are generally purchased by grocerymen or fruit peddlers who purchase enough to take care of their wants for that one time, and of course will not keep long after coming out of cold storage. The bulk of Bartlett pears in this country are raised in New York State. They are packed early; as soon as the pear has its growth, quickly placed in cold storage in New York State, for instance, pears picked today are hauled in this evening, shipped tomorrow, and next day are in cold storage plants near by, and held in cold storage until a market presents itself; then if they are to be shipped west, we frequently have them here loaded in refrigerator cars, arrive here in perfect condition, and after they arrive here, if we find it necessary to try to prolong the life, we take them out of the car and put them in cold storage again, but there is no necessity for these goods being exposed to the weather only in very limited quantities.

Professor Beach: This subject has been covered so well and so thoroughly I consider it good fortune for me to have the privilege of hearing this valuable address and discussions on this point. It is decidedly important that we understand the best methods of getting money back for a crop after we have grown it. It is all right to understand cultivation, methods of orchard management, and spraying, in order to raise good fruit, but then some men fail after they raise good fruit—fail in getting proper returns. The fact is that if you are going to put apples in cold storage at all, they want to be put in right from tree. In some apple growing sections of New York, some cold storage people declared a year ago they would not accept them in barrels lying around in farmers' woodhouses or cellars; their experience had been, it would not pay, and they had found by experience that in some sections of the country

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it is desirable to get apples from the tree into cold storage immediately. The other idea was, the work this Society may do in helping select list of varieties for planting which are good cold storage fruits. There is a difference as to how well they handle in cold storage; some varieties of apples are liable to scald in cold storage —a very important matter. If the coming methods are to be cold storage and cultivation of leading varieties, it is very important that we select those varieties which are handled well in cold storage.

SOME DUTIES WHICH THE NURSERYMEN OWE TO THE GENERAL PUBLIC.

BY W. H. FREEMAN.

(No copy of this paper was obtained, but a clipping from Orange Judd Farmer is here given.)

W. H. Freeman told of some of the duties which nurserymen owe to the general public. Among others was the necessity for establishing a better sentiment of general honesty and thus gaining the confidence of the public which has in a measure been lost through misrepresentations by unscrupulous parties. He objected in strong language to the extensive advertising and planting of Carolina poplars. He argued for the planting of windbreaks for orchards and closer planting for better protection from storms and sun. He also stated that forest planting had become imperative and urged nurserymen to prepare to meet the demand for native forest trees which is already here.

DISCUSSION.

Mr. Cox: I would like to know why a tree set in fall and rounded up with dirt won't grow just as well as heeled in and set in spring? My experience is, the best time is to plant in the fall, and get it out of the way for spring work.

Mr. Freeman: Trees planted in the fall and rounded in carefully may do just as well as planted in spring, but the chances are against them, as they do not get good root-hold and the spring climate and winds of winter evaporate moisture from the limbs. If planted in the spring the root-hold is sufficient to keep up moisture circulation all winter and overcome them. I am not saying that fall planting is not good, but that spring planting is better.

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Mr. Little: If I were to plant any hardy trees preference would be to fall. You know greenhouse men encourage roots by heat. A cutting is full of material growth, and does not have power to make root. Direct it down and cause it to make roots, and then it has something to sustain it. All men who propagate cuttings know this is a fact. Plant a tree in the fall and round it up and in spring level it down. The earth has a certain amount of heat in it, and the roots are down where they receive this heat, and in spring when the weather gets warm the roots start. If you plant a tree properly in the fall it certainly will make twice the growth the following season and is much surer to grow than a tree planted in the spring.

Mr. Shoemaker: What varieties of forest trees do you recommend to be planted in this State?

Mr. Freeman: If any of you wish trees from the Agricultural Department, if you will send your names in I will try and see that you are all supplied. As to what quantity they will supply, I do not know, but can not say that they will supply any large quantity. Probabilities of Congress not doing much in that line.

Mr. Maish: Would you recommend trees native to State?

Mr. Freeman: It depends on what you want to plant for. If for commercial purposes plant such as walnut, ash; if for other purposes, altogether different.

Mr. Shoemaker: It is hard to tell what would be the needs of the farm for ordinary purposes, for lumber.

Mr. Freeman: For posts and fences I recommend five trees, black locust, osage orange, Kentucky coffee tree, Russian mulberry and catalpa. They are pretty good growers, and are durable when set in the ground. These trees are selected with that idea. For general farm lumber there is nothing for quicker growth than elm, ash and walnut. Hickory is a slow grower. Birch are good growers, also wild cherry. Forest trees are not quick growers to make lumber. That is one thing against the business. This generation will have to plant for the next generation. For shade purposes plant the native forest trees, sugar maple, elm, green and white ash, most all oaks outside of white oak. The soft maple is not a good tree for shade, while it is one of the quickest growers and temporarily is all right, but it is not doing well because it is

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a tree that requires a great deal of moisture, and in a few years the trees die because the water supply is cut off. Plant trees with roots going down. Sidewalk should be next to street.

Mr. Maish: In regard to healing in, we have different ideas. Do you cover the entire tops or not?

Mr. Freeman: Leave the tops exposed with tops to south and roots to north.

Mr. Little: Have you any evidence in regard to the durability of Kentucky coffee tree?

Mr. Freeman: Yes, sir. There is evidence. I based the information I am giving you on reports sent in from different parts of the State. The Union Pacific railroad is using them, and they are recommended as the best for these purposes.

Mr. Little: What is the best evidence as to durability of catalpa?

Mr. Freeman: Pennsylvania railroad ties in use for fifty years are as good now as when put in.

Mr. Little: What time were they cut?

Mr. Freeman: All seasons of the year, I suppose. In cutting fence-post timber, never cut them in sap. Catalpa cut in full sap will rot in three years, but if cut in winter time, I have records where in this State it has been in the ground twenty-five years and is good today.

Mr. Davis: Are there not two species of this tree?

Mr. Freeman: The catalpa speciosa is the only one that lasts. The catalpa speciosa or hardy catalpa is the one you want to plant for posts. The other does not have the lasting qualities.

ELECTION OF OFFICERS.

The President declared the next business in order was the election of officers. The result of the balloting showed the following:

W. W. Stevens, of Salem, was elected President.

E. M. C. Hobbs, of Salem, Vice-President, Southern District.

W. C. Reed, of Vincennes, Vice-President, South Central District.

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E. B. Davis, of Cartersburg, Vice-President, North Central District.

J. C. Grossman, of Wolcottville, Vice-President, Northern District.

W. B. Flick, of Lawrence, Secretary.

Sylvester Johnson, of Irvington, Treasurer.

Joe A. Burton, of Orleans; Prof. James Troop, of Lafayette, and H. H. Swaim, of South Bend, members of the Executive Committee.

AFTERNOON SESSION.

Friday, December 6, 1:30 P. M.

The Committee on Exhibits made its report through W. C. Reed, Chairman. (No copy of this report could be obtained.)

The President, Mr. W. W. Stevens, announced the next in order the consideration of the subject of "The Conditions of Success in Growing the Bush Fruits," and that Mr. D. F. Maish would introduce the subject.

THE CONDITIONS OF SUCCESS IN GROWING BUSH FRUITS.

BY D. F. MAISH, FRANKFORT.

The conditions attending the successful production of bush fruits, such as raspberry, blackberry, currant and gooseberry, are not very unlike those attending the production of all other fruits and farm crops. There are some special adaptations that should be observed in regard to soil, location, etc., but we believe the bush fruits will succeed over a larger range of territory than those of any other species. They are also a safe and profitable crop to grow for either home use or for the market. The application of good, ordinary common sense to the selection of soil, location and varieties, coupled with perseverance and industry, is certain to bring good results in growing any of the bush fruits. If you desire to grow these fruits for market purposes, you should study the needs of your locality and if there is not already a demand for such fruit it is better to begin on a small scale and "work up" your trade until you have reached your capacity. The facts are that there is always a good, healthy demand for these fruits all over the country, and except in some unusual seasons, at good living prices. Don't try to grow fruits for market if

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you have a dislike for the business or if you have no adaptation to it. It takes a good salesman to get best results from the business. The production of fruits of the highest quality is the greatest help in reaching the best markets and highest prices. Study, think, work. These are some of the conditions of success. No man will succeed at this or anything else if his mind is not set to his work, and he is easily switched off onto something different. To be more specific, we wish to notice a few of the essentials to successful fruit culture as relates to the soil, the climate and the man. These three, with cultivation and selection of varieties added, we believe to be the conditions upon which success or failure depends.

We all understand that without soil we can not proceed to grow anything in plant life. We are also aware that extremes of heat and cold and moisture are not conducive to plant growth of any kind, much less to bush fruits. We know, too, that the man, the real thinking, acting man, is that upon which most of all depends for success. Crops must be planted, cared for, and harvested in turn. Proper varieties must also be selected.

The Soil.—The soil best adapted to bush fruits is one that is neither too light nor too heavy. Well drained clay soils put in a proper state of fertility by the frequent use of barnyard manures and clover and cultivated in some hoed crop, sweet corn, potatoes or beans, makes an excellent site for any of the the bush fruits, and, in fact, fruits of all kinds. Sugar tree land is considered ideal fruit soil in Indiana. If you haven't sugar tree soil on your place make your soil to conform to that kind as near as you can. Light, chaffy soils are to be avoided. Black land seems to have the fault of growing too much wood and not enough fruit. It also has the fault of not giving good color to fruit. In a seven-acre blackberry plantation where the rows are eighty rods in length, and where soils of almost all kinds are encountered, we find the heaviest loaded bushes and the plumpest, juiciest berries on the higher clay points that were once covered with large sugar tree and white oak timber. Canes are more hardy, thrifty and upright in growth. We should recommend that all clay land be thoroughly underdrained with drains not above two to three rods apart. Don't try to get something for nothing. Our country is now old enough to begin to do things right, and this is one of the most important things to do.

The Climate.—While the climate is a very important condition to success, there is not a great deal to be said about it. The climate of Indiana is all right for bush fruits, and barring a very severe winter now and then and occasional late spring frosts we have little to complain of in the matter of climate. Raspberries have suffered most from severe winters. Not since the year of '95 have we had general destructive late frosts; and the

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season of 1901 we note as the most destructive to the blackberry crop from excessive heat and drouth. We lost a great many berries last season during the heated period for lack of help in picking. Hot? Indeed it was. I think every small fruit grower will remember it. But these extremes of climate are the exception and not the rule and no one need hesitate to plant bush or any other fruits in Indiana on account of the climate.

The Man.—As previously noted in this paper we believe man to be the most important link in the chain of conditions that relate to success. The man who is going to succeed with bush fruits can take "any old soil," in almost any climate, and get proper results. Man can bring success or failure at will. If the man isn't right, there's no use to talk about soils, cultivation, climate or anything else; success can not come. You can not imagine success without intelligent thinking man. He must know what he's about. He should have a natural like for the beautiful and the more intricate things of nature. He should be able to see something more in the business than blackberries, raspberries, gooseberries and dollars. He should have good business qualifications to enable him to place his products upon the market to the best advantage. He should be industrious, or weeds and thistles will infest his plantation and rob him of his profits.

Planting and Cultivation.—Planting should not be attempted until there has been thorough preparation of the soil by frequent harrowing and pulverizing until there is a fine level surface. The plowing should be deep. Ground should be in a state to crumble, so that the soil may be easily worked about the roots of plants. When everything is in readiness ground should be marked off in rows about seven feet apart for blackberries and six to six and one-half feet for raspberries, gooseberries and currants, and good, deep furrows made as needed with single shovel or any good furrowing implement. Plants should be set two to three feet in the row, with soil well worked about the roots and firmly pressed.

Cultivation should begin as soon as planting is done to break up foot marks and leave surface in a fine pulverized condition. Some root or vegetable crop can be grown between the plants the first and second year and thus prove a source of income while plants are coming into bearing. Cultivation should be thorough and frequent, and after the first year it should be shallow near the plants. For retaining moisture a good earth mulch is the cheapest and best. Prune blackberry and raspberry by pinching out leading bud when canes are from sixteen to twenty-four inches high, and in the spring cut back laterals to twelve or fourteen inches of main stalk. Gooseberry and currant should be pruned by cutting away old wood as fast as bushes become too thick. In selecting varieties, it is a safe plan to inquire as to what has succeeded in your locality. Also look up

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reports from the experiment station and State Horticultural Society. See what varieties have been tested. Many people have failed in growing bush fruits because they planted mostly of some new, untried sorts. Better to plant sparingly of new varieties until you have become acquainted with their merits. Nurserymen and tree agents have not always been fair in recommending the kinds that succeed. It is their business to sell the high-priced plants if they can; it is your business to know whether it will pay you to buy them. For a succession of fruits for both home use and for market we would recommend the following:

Blackberry—Early Harvest, Snyder and Taylor's Prolific.

Black Raspberry—Palmer and Gregg and Kansas.

Red Raspberry—Hansel, Cuthbert and London.

Yellow Raspberry—Golden Queen.

Gooseberry—Downing, Houghton, Pearl and Champion.

Currant—Fays, Pomona and White Grape.

In conclusion, let me say if you are an old man, plant fruits in abundance. If you are a young man plant them in greater abundance, and the generations that come after you will rise up and call you blessed.

President Stevens: The subject will be further continued by Mr. E. B. Davis, of Cartersburg.

CONDITIONS OF SUCCESS IN GROWING STRAWBERRIES.

BY E. B. DAVIS, CARTERSBURG.

To begin, I would say there are a few fundamental principles underlying or leading to successful fruit growing. And then there are a variety of accomplishments which could correctly be called successes. I have grown, on 400 hills, as fine berries and seemingly as many as could well be matured, considering the effort a success; I have grown patches as much for the pleasure and beauty as for the fruit and have met with success; but I presume the success we are to consider here is the kind that makes glad the pocketbook—the kind that makes a good bank balance. This latter success I have also had. Then what are the conditions of these successes? The man, market, soil, plants, insect and fungous diseases we have to combat.

The man must be a natural horticulturist and love his work and in many respects he must be a genius. He must learn at the beginning that a fine crop of fruit without a market will never land a bank account; that a good market with very inferior fruit will never compensate him; that it doesn't pay to begin on a big scale, but better do a little at a profit than

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much at a loss; that as his knowledge increases his capacity to conduct a more extensive business increases; that he must be genius enough to know where to locate, what and how much to plant, how to market, etc. He must understand soils, fertilizers and varieties; he should understand botany and entomology; in short, he must be fitted for this business or he will never be a winner. Laziness and success don't go well together.

The man and market are very closely related; the man can make the market and often the market can make the man—hustle.

I have always made it a rule to dispose of my fruit in nearby towns, rather than ship to large cities, where the returns are in proportion to the commission man's conscience; and another strong point in favor of home market is the opportunity to build up a fancy trade by educating your customers to appreciate a good article. Your fruit goes directly to customers instead of being used to top-dress somebody else's inferior berries. Use a private stencil on every box, be it pint, quart or crate, so that customers may learn your goods.

Establish a reputation by giving honest measure and honest fruit. I will not even hint to the members of this society that our customers like good berries in the bottom as well as on top of the box. Become familiar with the wants of your trade and supply those wants, then charge accordingly. That old thread-bare, worn-out saying, nevertheless true, that the market has never yet been supplied with fancy fruit, is especially applicable to the fruit under consideration.

Soil.—We designate our land as being rich or poor and sometimes the so-called poor soil, with proper treatment, is the most fertile; often the rich soil is deficient in some essential elements necessary to successful berry growing, so here comes the point where the man must be master of the situation. If he has the necessary education along this line he will be able to tell which soil will retain the most moisture, which soil is adapted to plant growing and which to best development of fruit. He will be able to tell a light, warm soil from a heavy, cold soil and use the manures and fertilizers accordingly. It does not seem that it would be necessary to state that the soil must be well drained naturally or artificially in order to insure success in strawberry culture, yet I know men who are trying to reach this commercial success by planting on water-logged soils, in low ground in order to beat a drought. Some plants will succeed fairly well under these conditions, and this brings us to the next topic.

Plants.—Some are adapted to low, mucky land; others to light, sugar tree soil, and others to heavy clay. In fact, we have varieties adapted to all soils, climates and conditions. This is very fortunate for a certain class. (I mean those who beg a few plants, set them out and never see

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them again till berry time next year.) But I do believe one of the most important conditions of success is starting with good plants. The plants that I use must have a good bunch of clean, yellow roots, a large fruit crown and healthy foliage. Certain varieties produce much stronger plants than others under similar conditions; so the strongest of each variety must be used. They need not be pedigreed; sufficient if good, clean, healthy, pure stock, with the pedigree expense left off. This latter statement is from both observation and personal experience.

Now, after discussing the man, market, soil, plant and varieties, and having everything all right thus far, and are ready to land that bank account, we may see it slip through our fingers and away from us if we are troubled with insects and fungous diseases. Those ideal plants may have a year's growth, and, in fact, may be loaded with blossoms and even fruit and then our hopes fade away when those little leaf rollers begin to devour the glossy leaves, the lungs of the plant. And even after the fruit begins ripening, a very bad case of rust will ruin half the crop; so we are not so sure of that desired success until every berry is marketed and every bill collected; and, must I acknowledge it, sometimes the balance is on the other side of the ledger. Unless all these fundamental principles are closely followed, and a hundred other minute details are closely watched, we can not hope to reap the reward awaiting us.

To those desiring berries for home use, I would say that there is nothing impossible about growing them. Prepare the soil early in spring, set good plants, even if they cost two or three cents each, and be careful about getting both bisexual and pistillate. Give good cultivation, mulch when the ground is frozen, and next spring, when fresh fruit is a temptation, you will have an abundance of the choicest fruit to set before your "better half" and your "little ones."

[The stenographer's report contained no discussion of this subject.]

The President: The next subject on the program is "Advantages of the Local Horticultural Society," by Mr. Royer.

ADVANTAGES OF THE LOCAL HORTICULTURAL SOCIETY.

BY E. E. ROYER, WOODRUFF.

This subject naturally divides itself into four principal phases, viz.: Social, literary, educational and practical. We are living in an age when mutual interests and mutual desires must be carefully considered. We are taught that "No man liveth unto himself," but that his duties are of a three-fold nature, viz.: to his Creator, to his fellows, and to himself. Our

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business relations of the present demand co-operation and united effort. It is not only a privilege but an imperative duty that we should unite in common interests, not for self-aggrandizement, not for filthy lucre, but for the elevation of our occupation and those who are engaged therein. Our State societies can do much to enhance common interest in our cause. Our district societies may enthuse the leaders, but our local societies must reach the masses. It must come into the home and draw from the "sons of toil" thoughts, ideas and practical suggestions. For upon the common people of any cause rest the push, energy and prosperity of that cause.

The social feature of our local societies is of much and lasting benefit to its members. The hospitality of the farm home outrivals all others. It is informal and unassuming, a true expression of the inner life. Not artificial and superficial, but deep rooted and well founded. The words of welcome, the kindly smile, the hearty shake of the hand and the ladened board, bespeak in stronger terms than all the pomp and gayety of the world. Those homes desire and welcome friends, visitors and companions, and companionship is a boon to the human race. It is that which encourages, cheers and consoles. Many lives are brightened, many pathways are made smoother, by the companionship of humanity. Its desire is universal. It is found in the most degraded beings of creation, lodged in the hearts of the sturdy peasantry of the world, and is not lacking in the most cultured and refined. This desire had its origin when man was placed in the garden of Eden, and it will remain until he ceases to exist. Its culmination is in the home of the horticulturist and farmer. It is not sham, but genuine worth. We often think of the world as being cold and formal, and many times we are judging rightly, but in these homes all formality is cast aside and we are all free to think and do as we deem prudent, and each meeting will place us upon a higher plane of sociability. Each noble thought and deed will react in our own lives and make them better. The literary culture received by our younger members and many of our older ones, is of great benefit. We say older, in years but not in spirit, as progression is characteristic only of those who are possessed of this endowment. Hence all should be young. This phase of culture is recognized in all professions as being a prime essential, and who will deny the fact that horticulture is a profession and ranks on an equality with others? The papers read, the varied discussions given, and the talks rendered will be the means of arousing a love for the cause of horticulture and agriculture in the hearts and minds of the young, and volunteers will not be lacking for the cause, and without a love for the occupation success will not be achieved. Our great poet, Longfellow, has truly said that "the heart giveth grace unto every act." Literary culture is also necessary to poise our lives and character, and without it we be-

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come mental dwarfs. We must be balanced in the moral, mental and physical, for without this culture we fail to justly and rightly perform the duties and functions assigned us by our Creator.

In the third place, the training that we receive in this literary work is educational in its nature. We assemble in those homes not only to cultivate sociability, satisfy the physical appetite and listen to others, but also to reason together. To grapple with the complex problems which arise, to consider the proper solution of those problems and acquire power to master them. Education does not consist only in storing the mind with facts, but the assimilation of these in our own lives. Assimilation of facts comes largely from discussion and interchange of ideas. Facts must be revolved in the mind; they must be considered from all sides, and must be enlarged and expanded; relations must be discovered and traced. The farm, the garden and the orchard all form laboratories for the most profound mind and logical investigator. Nature with all its wonders, its beauty and grandeur, unfolds itself to the student. Our scientists construct laboratories in art, in medicine, in chemistry and in physics, but these are only side shows to the great panorama that is portrayed in mighty splendor in the farm, garden and orchard. These subjects are treated in general by those who have a knowledge of the same, and by this an education can be acquired that is second only to that received in our regular agricultural schools and colleges. In this way an education will be gained that will give us power to reason, investigate and construct. Systematic development is an absolute necessity in any profession. The mind must be trained along the lines of right, clear and logical thinking. The world has ceased to place the greater stress upon muscular development, and now recognizes the development of mental power as paramount to all others. In our local societies the work is performed in a general way, along those lines just indicated.

In the fourth and last we consider the practical phase. Our age is an extremely practical one. There is constant clamor for practical men and women who have thoughts and ideas of their own—original ideas that are products of their own investigation; men and women who have the science, and with it the constructive art. By constructive art in horticulture and agriculture we mean the power of discrimination and selection; power to put into practice thoughts and ideas that are obtained from others; to bring under our control the chemical and physical force in effect about us; power and judgment to decorate and arrange, conducive to beauty and gracefulness. The mind, although it may not be cultured, is sensitive to confusion and disarrangement, hence the necessity of this constructive principle in the great laboratory of the farm. The ultimate, in any profession, is the practical. Success is dependent to the extent that we can

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apply our theories and ideas. It is true that theory must precede practice, but practice must follow theory or failure results. These local societies do much to arouse the dormant brain and slumbering mind, quicken the activity of thought and create a spirit of inquiry which leads to investigation.

Let us then encourage our local societies by word and deed. Let us endeavor to so instruct the coming generation that they may cultivate a disposition of sociability, a love for literary work, and a desire for a broad and liberal education, that they may be prepared for life in a practical sense when its reality dawns upon them.

DISCUSSION.

Mrs. Stevens: I do not believe anything I may say would profit you, and there are other discussions that will. The points in the paper were all excellent. While the State Society is supposed to give instruction to local Societies, local societies are supposed to give aid and support to the State Society. Had we a local Society in every county in the State, and that Society sent but two representatives, the information given in the State Society could be carried back to local Societies and be a benefit. Also the benefit by exchange of opinion would be of inestimable value. In discussions that come up here, we see very readily, conditions that prevail in one section do not prevail in another, but general principles are applicable to all, and this should form a bond of union between local and State. This is the most important feature of the question.

Mr. Kingsbury: Do any members present have any receipt for bringing the young people into this Society? For years we could not get young people to take an interest in our Society. If any have succeeded I would be glad to hear of it.

Mr. Swaim: There is one thought occurs to me, and it seems to me it would add as much to the State Society, as Mr. Kingsbury suggested, to get young people into local Societies, and that is, there should be some effort made to get more of the ladies to attend our meetings. At all meetings the ladies have been very conspicuous by their absence. Our local Society took action at their last meeting which I think is to be commended. They resolved to pay the expenses of a delegate to attend the State meetings. The action we took at our last session was to not only send a delegate, but

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send his wife along with him, or at least pay expenses, if she wishes to come, and I believe if the Societies would take that action we would have better attendance of the ladies.

Mrs. Stevens: I notice the same fact is present in meetings of all kinds. We notice we have not the young people. You in the Marion County Society, here, are in a worse fix than in the country, as you have so many attractions outside. Where local Societies are held in country towns there is not the trouble in getting them there that there is in your Society here. But you will notice it in farmers' institutes and in churches, we are not getting many young people, especially the young men, but there is no royal road to success in getting young people to attend.

Mrs. Royer: Our Society is composed of about one-half the young married people in the county, about thirty-seven members. When first organized, two years ago, there were only about nine, and we think we have done well. Some think when father and mother join, that includes the whole family, and this year we have conducted a class for young people. Sometimes we took for our subject the apple; and young married people conducted that class along the line of describing the apple. Would prepare questions and give to young people, and they would read them and ask such questions as would distinguish the apple. Sometimes we take the strawberry. The young married people have taken an active part in the Society and also the Farmers' Institute. We feel we have much to be proud of.

Mr. Henby: It seems to me this Society could be made to grow and have enough life in its meetings to cause the attendance of several hundred. The special rate on railroads would add a great deal to it. The car fare is quite an item. If we could get half rates we might bring our wives.

Mr. Grossman: In our section of the State we took advantage of the rate this week at the Poultry Show.

Adjourned.

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REPORTS OF LOCAL SOCIETIES.

REPORT OF THE WAYNE COUNTY AGRICULTURAL AND HORTICULTURAL SOCIETY.

WALTER S. RATLIFF, SECRETARY.

To the Indiana Horticultural Society:

I herewith submit this, my annual report of the Wayne County Agricultural and Horticultural Society, and with it a roster of the officers of the society for the year 1901.

Our organization held twelve regular sessions during the year. A part were held in the society's room in the county court house in the city of Richmond, where afternoon meetings occurred. The remaining sessions were all-day ones and were held at the country residences of some of the members, where the attendance was large and hundreds partook of the picnic dinners that occurred at high noon. These dinners, together with the co-operation and hospitality of the host and hostess, made these rural sessions among the most enjoyable and pleasant ones of the year.

The exhibition tables at all meetings contained, in their seasons, the results of man's labor on the farm, orchard and garden, and it has been amusing to note the friendly rivalry among the growers of these articles. The ladies, too, often exhibited fine potted plants in bloom and bouquets of beautiful cut flowers in their season.

The annual, February, was one of the most pleasant features of the society's work, and enjoyed by hundreds. The premium lists having been previously announced, the housewives industriously vied with one another in their efforts to secure the premiums on the culinary articles, such as roast fowl and beef, breads, pies, cakes, butter, salads, jellies, etc. The awarding committee, after completing its work, the premium articles were placed on other tables already laden with all the viands that were necessary to make a dinner complete. The society was fortunate in securing addresses from men and women of influence and culture, which added largely to the entertainment and instruction of those present.

Officers for 1901—President, Caleb W. King; vice-president, Rev. R. D. Laughman; recording secretary, Walter S. Ratliff; treasurer, J. P. Norris; corresponding secretary, Hon. J. C. Ratliff.

Apples.—Although some varieties were wonderfully well laden, yet the apple crop was not an average one. The summer and early autumn varieties did fairly well, but the codling moth and other insect pests, together

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with the severe and protracted summer drouth, lessened the yield of the earlier varieties and almost obliterated the winter supply of the later sorts.

Pears.—A fine season for pears, and, although the bulk was not so large as common, yet the supply almost equaled the demand. The early Catharine, Tyson, Fall Butter and Lawrence were seemingly affected most by the drouth.

Plums.—Although not so large a yield as common, yet the specimens were practically free from insect ravages and other imperfections. So many of the plum trees, especially of the Damson variety, are at present affected with the dreaded black knot on the branches that the further planting of this very important kind of fruit is likely to continue to be sadly neglected.

Cherries.—A fair yield, with fruit of a good quality and reasonably free from insect ravages. The older trees did best and the supply almost equaled the demand. It is hoped that more generous planting of cherry trees will be had, especially throughout our cities and towns, where they always bear well.

Quinces.—Since the severe freezes of a few winters ago, the quince bushes have hardly regained their former growth and vigor, and the supply was far inadequate. The ease of propagation of quince cuttings ought to be an incentive to lovers of this kind of fruit to have more trees growing in their dooryards than are at present found.

Peaches.—Trees in protected localities were heavily laden as well as many others in more exposed places bore a fine lot of fruit, so that the local supply was ample, and the impetus given to future peach culture by the past two years' crops, will be lasting, and many new individual trees, if not small orchards, will be planted.

Grapes.—An exceptionally small yield. The vines were severely winter killed, with a wet spring, followed by a dry summer, together with the ravages of the troublesome berry worm, reduced the chances for a crop so that at the time of ripening but few perfect bunches of grapes were to be found on most of the vines.

Dewberries.—The cultivation of this most excellent fruit has been, especially in this section, almost entirely abandoned, perhaps on account of its uncertainty of bearing; yet it is possible that our soils are not adapted to its successful culture and our fruit growers may not have a knowledge of the correct manner of its cultivation.

Strawberries.—Within recent years the increase in the demand for this staple fruit has been remarkable, and fruit men have made special efforts in their endeavor to supply the home demand. The crop was not so large, however, as usual, but the fruit was of good size, highly colored and of fine flavor. The introduction of so many new and valuable varie-

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ties has enabled the consumer to have a longer season of ripe berries, and a larger assortment to select from, so that the tastes of all individuals can be better suited.

Blackberries.—The severe drouth came just prior to the period of ripening and at a time when an abundance of rain was needed to perfect the fruit; as a result the crop was a failure, and the unnatural mummified berries remained on the canes and never ripened. The berry patches have been largely cut down, removed and burned.

Raspberries.—A portion of this kind of fruit ripened before the drouth became so general, which were marketed when ripened fruit was needed most. The root rot that worked below the surface of the ground on the plant, and the white scale that attacked the canes, has depleted the patches, in some cases, entirely, as removing and burning is the only alternative.

Ornithology.—The economic relation of ornithology to fruit culture is becoming more and more understood, and it is quite gratifying to the horticulturist to realize that our native birds are at last protected from the egg gatherer, hunter and nest destroyer by our State laws.

REPORT OF THE LAGRANGE AGRICULTURAL AND HORTICULTURAL SOCIETY.

BY MRS. LIZZIE C. ROYER, SECRETARY.

The past year has been a period of activity and gain. The society is only two years old and has a list of forty-four paid members; total number of members over 140. It held six regular meetings during the year and had an interesting program at each meeting and an exhibit of fruit and flowers at almost every meeting. The midsummer meeting was held in the Lagrange County court house yard and Professor Troop and C. M. Hobbs were the speakers of the day. The others were held at the homes of the members. One called meeting of officers and workers was held. It sent a delegate to the Indiana Horticultural Society at Indianapolis, who exhibited forty-two plates of different varieties of fruit; also a delegate to the State Board of Agriculture meeting at Indianapolis.

Several members attended the summer meeting of the Indiana State Society at South Bend. The following officers were elected at the December meeting for the year of 1902: J. C. Grossman, president; J. W. Mills, vice-president; Lizzie C. Royer, secretary; Marion Garmire, treasurer; executive committee, John F. Stough, R. H. Newman, A. J. Seagley; program committee, Mrs. J. W. Mills, R. C. Case, E. E. Royer; library committee, E. E. Royer; membership committee, Mrs. R. C. Case, W. F. Clugston,

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Mrs. Ocia Eshelman; year book and advertising committee, J. C. Grossman, Henry Eshelman, Charles Royer, J. W. Mills, R. C. Case, R. H. Newman, Benjamin Ruhl, M. E. Horner; music committee, Misses Edith Mills and Nellie Eshelman and John Seagley.

RECEIPTS.

Cash balance on hand, December, 1900	$0 65
Membership dues, 1901	23 50
Premiums of State fair and State societies	8 50
Sale of apples	1 00
License fund	55 00
Total	$88 65

EXPENDITURES.

Delegate to State meeting	$10 50
Printing programs	3 50
Printing receipt book	1 25
Benton Harbor trip	9 00
Express on apples	1 15
Plates	20
C. M. Hobbs, expenses	8 00
Miscellaneous	3 50
Total	$37 10
Balance on hand	$51 55

The society is getting out a year book which will contain names of all members, programs for the year, names of all committees, thirty pages or more of advertising and much other information of value.

The apple crop in Lagrange County was light and a fair crop of small fruits. The season was very dry.

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SELECTIONS—MISCELLANEOUS.

HORTICULTURE OF INDIANA.

Indiana is essentially a fruit-growing State. There is no part of its soil that can not be made suitable for the production of fruit of some kind. There are portions, however, that are better adapted to the growing of wheat and corn or grazing, on account of the prairie character of the soil, or the climatic conditions which render the cultivation of orchard fruits a precarious business. By referring to the weather bureau map it will be seen that the mean annual isotherms for the year 1898, and the same will hold approximately for a series of years, are quite irregular in the northern part of the State, while in the southern half they run more uniformly across the State. This is caused very largely by the ameliorating influence of Lake Michigan, felt very perceptibly along the northern counties which are protected from the severe northwest winds; but it is not felt in any appreciable degree as we go down the western side of the State. And so it often happens that the temperature falls lower seventy-five miles south of Lake Michigan than it does in the counties bordering on Michigan. This difference is often great enough to render peach-growing in this section, as a commercial business, out of the question. From the northeastern portion of the State south to the Ohio river, and covering all that territory not already mentioned, the climate is not so severe, and fine crops of peaches are often produced.

FOR GENERAL FARM CROPS.

A line starting near Michigan City and running in an irregular direction, and taking in most of the famous Kankakee marshes, thence in a southerly and westerly direction, finally striking the west line of the State a little north of Terre Haute, will show, approximately, that portion of the State that is better adapted to the growing of general farm crops than fruit. This is not wholly due to climatic causes, but in a large degree to adverse soil conditions. A large portion of this region is flat prairie land, much of it once covered with marshes, but with modern drainage facilities nearly all of this naturally fertile land has been improved until it has become one of the best farming sections in the State. Only occasional spots, however, are high enough for orchard purposes, but small fruits and vegetables grow with the greatest luxuriance, large quantities of which are shipped to the Chicago market.

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A region in the Kankakee valley, including Starke and adjoining counties, is famous for its sugar beet productions. The soil here is of a sandy nature, eminently adapted to the culture of this vegetable, specimens having been analyzed which yielded 22 per cent. of sugar, with a co-efficient of 90 to 95 pure.

While there are not many large commercial orchards found in the northern and eastern portions of the State, the soil and climate are admirably adapted to the growing of all kinds of orchard fruits, with the exception of peaches, which are grown only to a limited extent. Here we find a sandy or clay loam, with clay subsoil, which was originally covered with oak, maple, hickory, walnut and all kinds of hard woods found in this climate. The surface is more or less rolling, with numerous small lakes dotting the landscape, thus insuring both soil and atmospheric drainage. In the shallow waters of some of these lakes and marshes the cranberry finds congenial surroundings, and in the sandy districts of Pulaski, Fulton, Kosciusko and surrounding counties the huckleberry grows to perfection.

In eastern Indiana the plum and the cherry are grown more largely than the peach, while the central portion of the State excels in pears. Small fruits are abundant everywhere.

IN THE SOUTHERN PART.

Southern Indiana has a mean annual temperature of from 8 to 10 degrees warmer than has the northern end. With other favorable conditions in the way of soil, protection from severe winds and perfect atmospheric drainage, owing to the fact that the country for the most part is quite hilly, the peach and other tender fruits are successfully grown. Here on the banks of the Ohio river was, until recently, one of the largest peach orchards in the middle west, and even now orchards of from forty to fifty thousand trees may be seen on the "Knobs" in Clark and Washington counties. Here, too, is the home of the "big red apple" (Ben Davis) and the Keiffer pear. The largest Keiffer pear orchard may be seen near the town of Salem, in Washington county. This orchard consists of 12,000 trees. The soil in southern Indiana for the most part is quite different from that found farther north. In a report of the United States geological survey, made some years ago, mention is made of the "white clay lands" which cover a large portion of southern Indiana, Ohio and Illinois, where most of the finest fruit is grown. In Indiana the northern boundary of this peculiar formation, according to the description, begins near Terre Haute on the west and passes more or less irregularly across the State, passing into Ohio near Brookville, Franklin county.

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Thus the greater portion of the State south of this line is made up of this white clay deposit. In many places this clay becomes almost a brick red, but the characteristics are, in general, the same whatever the color. An apple orchard consisting of such varieties as Ben Davis, Rome Beauty, Winesap, Rall's Genet and Grimes' Golden, planted on these clays is certain to reward the owner who gives it intelligent attention.

Here is also the home of the pawpaw (asimina triloba) and the native persimmon (diospros virginiana). Excellent varieties of the latter are cultivated to some extent for the large markets, but the industry is as yet in its infancy. Both of these wild fruits offer a wide field for investigation.

This section also includes the famous melon districts, where both musk and watermelons are grown to perfection. Hundreds of acres are grown annually, and the products shipped to the larger cities of the north and west.—J. Troop, Purdue University.

FRUIT GROWING IN INDIANA.

There is no truer saying than that "we know less about the things near us than those far away." The possibilities of horticulture in Indiana are simply wonderful when we begin seriously to study the question of fruit growing.

There is no fruit except the citrus or tropical varieties that can not be grown within her borders with some degree of satisfaction and profit. 'Tis true, there are a few limited areas of country in some parts of the United States that are producing more peaches than we are, and in some instances apples as well, but not because they can do it better or more cheaply, but because their lands have been "boomed" by capitalists, railroads and land agents for all they are worth and people have been induced to make special efforts along these lines. Even granting that special crops can be grown in certain localities to the very highest state of perfection only goes to show that these particular localities are adapted to special crops while Indiana is an all-purpose horticultural State.

NECESSARY TO SUCCESS.

There are a few absolutely necessary conditions to make commercial orcharding a success—these are cheap lands, nearness to large rivers or lakes, air drainage, suitable soils and market facilities. The more of these essential conditions that can be combined the more profitable will be the venture. All up and down the Ohio river there are to be found cheap lands with soils especially adapted to the growing of tree fruits and small fruits as well. In the central part of the State, with Brown county

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as a center, we find cheap hill lands, a productive soil and air drainage, and here most all kinds of fruit can be grown abundantly and profitably. Then there are the lake regions of the northern part of the State, which are bound to develop some profitable fruit industry when directed aright. These fruit lands will only remain cheap until enterprising horticulturists discover their adaptabilities and possibilities.

Experience a long time ago taught our orchardists that hill or knob land was best suited for growing fruit—that fruit "hit" oftener and was of better quality than in the valley or flat lands. Later on it was demonstrated that cold, damp air flows down hill as readily as water, and when the hills are cut into by frequent ravines, gulches or valleys the cold air is quickly drawn off the hilltops and hillsides and the loss from late frosts or winter heaving is reduced to a minimum, and annual crops may be expected with a fair degree of certainty if the orchard receives proper attention.

Most of our low, flat lands are high-priced because they produce the cereal crops most profitably, but these soils are mostly alluvial and do not contain the mineral elements of plant food in right proportion to give us satisfactory fruit crops. But when we go to the clay lands of the hills and slopes we find full compensation for what was once thought to be the niggardliness of nature. Here we have the conditions necessary to grow the finest fruits the country produces.

Southern Indiana produced the apples that carried off the honors at the recent world's fair at Paris. It was Indiana fruit that captured the best premiums at the Buffalo exposition last season. We were told recently by the largest handler of fruit in the State that Illinois and Missouri might boast of their fine red apples, but Indiana grows redder and better ones. California might grow larger fruit, but it was inferior in quality and looks when compared with the best produced in the Hoosier State.

LACK OF FRUIT.

While there is no doubt but what we can produce the very best fruit to be found in the country, the trouble is we don't grow it in sufficient quantity to even meet home demands, to say nothing of contributing what we might to other markets. From the very best authority we learn that during the past ten years over $10,000,000 have gone to other States for fruits of various kinds. What we need is a general awakening along the line of the possibilities of fruit culture in the State in order that we may have more concert of action among fruit growers. We need more cooperation in fruit growing, and among horticulturists in the fruit sections

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of the State. When we stop this leak of over $1,000,000 annually that goes abroad to bring in fruit for home consumption, that is not as good as we can grow, and add to it one or two million dollars of fruit to be exported, then, and not tell then, will Indiana take her just rank, which is as the grandest horticultural State in the Union.

But individual effort will be long in bringing about this desirable result. The development of horticulture in Indiana has been a long and continued struggle with little or no State aid. Most of our oldest and best workers have given their long life, time, money and energy to the cause and are now poor. We have their experience, and, to a great extent, it is no longer experimental. What we now need is State aid sufficient to place this experience with every one who owns land that is adapted to fruit growing for commercial purposes.

Many newer States devote yearly fair amounts for the furtherance of horticulture. Michigan, with nearly half her domain yet covered with the original forest, appropriates $4,000 yearly to horticulture. Even some of the blizzard-beswept States of the northwest, where only small fruits can be successfully grown, make liberal appropriations annually to the cause. Our last legislature appropriated the sum of $1,000 for the use of the State Horticultural Society. It ought to be made four or five thousand by the next General Assembly, which would enable us to develop this great industry and put it on a footing that would bring in millions of dollars to the State, instead of being a tax on our people, as it now is.

With the little means it could command, by voluntary contributions and assessments, the State Horticultural Society has established the only experimental farm in the world devoted to the improvement of the apple, the leader of all fruits. Here the work of originating new varieties is being carried on, in rather a small way, of course, for lack of funds, but this farm is being watched carefully by leading horticulturists all over the world and great things are expected of it.

Another thing we need is more local horticultural societies, extending out into such parts of the State where fruit farming could be made profitable. By these organizations there would be an awakening to the possibilities of Indiana as a horticultural State, our fruit products would be greatly multiplied and millions of dollars annually added to her income.

Meanwhile, it is our duty, as well as it should be our highest aim as horticulturists, to go ahead in all lines of progress, letting our light shine into "the dark places" as much as possible, be ever on the alert in our profession and hope for that reward that comes from good intentions and good works, superintend by good and unselfish motives.—W. W. Stevens.

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WHAT BECOMES OF THE NURSERY STOCK?

While 250,000,000 trees were sold by nurserymen last spring only 150,000,000 are alive today, including all planted by fruit growers in past years. This is as nearly as I can quote Professor Bailey's first words before the recent Nurserymen's Association at Niagara Falls. I quote from memory and may not be quite accurate in figures in every instance. Only one in five lives to yield any fruit. Only one tree in sixteen lives at all. Only one tree in one hundred that lives gives anything like good results. The loss of seeds is equally as great. These facts indicate great carelessness or lack of experience in planting trees or seeds, yet the loss is no greater than that which seems to occur to the usual forces of nature, though in nature there is no waste of substance. The robin hatches, say, five young birds each season. If all the young lived, in ten years the increase from one pair of birds would amount to fifty thousand birds; thus the world would be overrun with robins. In nature not one seed in one thousand lives to make a plant or tree, and of those that live not one in one hundred ever reaches the blossoming stage. Not one fish egg of one thousand hatches, and but few that hatch survive long enough to reach mature size. If all the fish eggs hatched, and all young fishes lived, the waters of the earth would become solid with fish, so as to impede navigation.

It is not the fault of nurserymen that more trees sold and planted do not live to produce abundant harvests of fine fruit. Many people who plant trees have not the experience necessary to make them live and thrive. Many planters do not do as well as they know how to do, in planting trees. If every planter made all of his trees live and produce as they might the markets would be flooded. John Burroughs considers the personality of each tree and vine. As we passed over his place he would remark: "This tree or vine needs more pruning, this vine was pruned too closely that one needs spraying, the other needs having its fruit thinned," etc. He knows the personal need of each. Time sifts out all dross, hence nurserymen should be watchful. If poor varieties are sold they will be discarded later. If you sell poor trees your trade will diminish. The careless planting of trees by the orchardist creates a larger demand from nurserymen. While it is your duty to instruct the fruit grower who plants your products, you are not responsible if that man neglects your advice.—Green's Fruit Grower.

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HORTICULTURE IN OUR SCHOOLS.

The necessity of teaching horticulture is becoming more apparent each day. Our young people do not manifest any interest in the subject, which they should. Why? I think it is because their education as directed leads them along other lines. The farmers' sons who have had horticultural instruction are few and far between. The farmer, as a general thing, gives little or no attention to horticultural work, but teaches his children to grow wheat, corn, hogs and cattle, leaving fruit growing to the few specialists employed in this industry. Fruit growing is therefore neglected and will continue to be neglected unless there is an effort to awaken an interest in the minds of the children through our schools.

Just how to do this successfully is an enigma. In Germany they incorporated into the schools textile manufactories, and between 1860 and 1890 we find the spindles increased from 1,699,759 to 2,600,000, almost double her number. The English became concerned at this alarming increase and sent an expert commission to learn the reason of German ascendancy in "textile manufactories." The conclusion arrived at was that textile schools accounted for it.

When a great country like Germany finds it profitable and necessary to establish schools for special purposes and another great country like Britain finds it necessary to appoint a commission to inquire after this state of policy it seems that we might profit thereby, and see to it that our schools are so conducted that both agriculture and horticulture should have a place in an education. True, we have our colleges especially for the instruction of these branches, but they affect only the few. The per cent. of our farmers' sons who secure a college education is far in the minority—possibly not above 10 per cent. By introducing into our common schools these branches would be of incalculable advantage to both the children and the community as well.—Western Fruit Grower.

SUCCESS IN UNDERDRAINING ORCHARDS.

It was the writer's privilege, a few months ago, to inspect an apple orchard belonging to Mr. Lee Goodwin, of Indiana, which had just come to bearing age and presented an uncommonly fine appearance. The trees were twelve years old and uniformly thrifty and symmetrical in form. Upon inquiry we learned that the orchard was thoroughly tile drained. Lines of four-inch tile were laid five feet deep midway between the rows of trees. Mr. Goodwin remarked that he had lost but two trees since the first setting of the orchard, and that the trees had flourished with no

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backsets from drought or winter freezing. It is customary to select a fine slope or knoll of pleasing contour, if such can be found on the farm, and from such land choose a site upon which to plant the young orchard. Natural drainage is commonly recognized as desirable, and even necessary, if fruit trees are to be successfully grown to a bearing age. If the surface is level and subsoil retentive, as is the case on Mr. Goodwin's farm, as well as over much of the surrounding country, there is no alternative but to use artificial methods of drainage. The disastrous effects of hard winters, requiring the resetting of from 10 to 15 per cent. of the young trees every year or two until the orchard is matured, have been avoided by the drainage of the soil and the care which Mr. Goodwin has bestowed upon his little orchard. It may be here remarked that this portion of the country was once regarded as too level for successful drainage. The abundant growth of all kinds of farm and garden crops, together with the success of the tile factory in the neighboring vicinity, have now thoroughly dispelled such notions from the minds of present land owners in that vicinity. The subject of orchard drainage has not been discussed so freely of late years as formerly, for the reason that the necessity of drainage, either natural or artificial, has been settled in the mind of the practical fruit-grower. It is, however, sometimes overlooked by those who plant but a few trees, and by the small orchardist who has neglected to give attention to all of the details involved in the successful growing of fruit. These details, by the way, are by no means trivial. No better time can be selected for doing orchard drainage than during the fall and early winter months, when the ground is not too wet and when labor can be more readily obtained than in the spring months. The experience of orchardists teaches that the drains should be four and one-half feet or five feet deep. When so placed there will be little risk from stoppage by roots, and, besides this, ample depth gives a more uniform condition of soil than more shallow drainage affords. As early as 1868 Spaulding & Co., of Springfield, Ill., began to tile drain their nursery and orchard grounds. This was done when little was thought of tile drainage throughout the entire country. The results of this work, as noted by Mr. Spaulding fifteen years afterward form an interesting record from which we gather the following:

Mr. Spaulding drained eighty acres for permanent orchard, laying the drains three and one-half feet deep and thirty feet apart. Great care was taken to do the work well. Every line of tile was plotted, so that its location might be definitely known. The grading of the ditches and laying of the tile were done by experienced men. The trees for permanent orchard were set so that the line of drain was midway between the rows. The surface is undulating prairie, with clay subsoil. In no instance have the roots of the trees interfered with the working of the drains. The

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trees have made strong and healthy growth. Mr. Spaulding claims that drainage promotes the maturity of the wood, both of fruit-bearing trees and of nursery stock. In dry weather the well-known effect of drainage in protecting the common farm crops against damage is also marked in its effect in fruit production. In this instance we have the practical test of the benefits of drainage in fruit culture for a run of years. It has been claimed by the advocates of farm drainage that tile drains improve in efficiency with age. Here the practical benefits have been tested year after year with no rising disadvantage. The open, porous condition of the soil, which admits of the rapid passing away of heavy rainfalls, has been uniform. Mr. Spaulding said that the surface drainage of a piece of land may be good, but long continued rains thoroughly saturate the soil and subsoil, which on untiled land will become compact and settle around the roots of the trees. The channels for the passage of water and air will become closed and remain so until some deep freeze-up lifts the soil again, and the trees will be damaged. Tile drainage provides against any trouble of the kind. The company picked 3,000 bushels of choice apples, while other orchards in the neighborhood, not drained, had but few. In the growing of nursery stock, drained and undrained lands have been used extensively, and in every instance the drained soil has produced the best stock. On drained land the trees have never developed any discoloration of the wood, so common on undrained soil. Mr. Spaulding's orchards number over 14,000 trees, and he says that he has never lost a tree from freezing on land thoroughly drained, but has had occasional loss from other causes. Dr. W. I. Chamberlain, in his book, "Tile Drainage," gives his experience with underdraining orchards on his own farm, near Hudson, Ohio. In summing up the effect of tile drainage, of different degrees of thoroughness, upon the life of the trees, in a period of sixteen years, during which time he replaced the trees which died, he gives the following concise statement: Where tiled both sides of each row, 13 per cent. replaced; where tiled on one side of each row, 36 to 41 per cent. replaced; where not tiled at all, 63 per cent. replaced. It is fair to add that the present thrift and bearing capacity of the trees are about in the same ratio. These are all cases of orchards planted on soils which have clay subsoils. The experience of their owners is given after a test of from twelve to sixteen years, and is a unit as far as demonstrating the value of tile drainage for fruit orchards. With these facts before us, is it not wise to give the closest scrutiny to soils upon which it is proposed to plant fruit trees? The failure of newly set orchards to grow to maturity without the annual renewal of a generous share of the original setting is a matter of remark by all who have planted trees during the last twenty years. That there are other reasons in many cases for such failure is doubtless true, but

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from the facts now known it seems certain that thorough underdrainage, either natural or artificial, is one of the necessary requisites of successful orchard growing.—Drainage Journal.

DIETETIC VALUE OF VEGETABLES.

If we would be healthy we must first be wise enough to eat vegetables and plenty of them. These bodies of ours can not be perfectly healthy without them. No one can attain health and high mentality without physical strength. Mother Nature has provided liberally for her children. It remains for us gratefully to accept the largest of her gracious guardianship.

Parsnips and salsify are highly nutritious if used in season. There is danger in eating parsnips very late in the spring. After they begin to sprout they acquire an acrid taste and are poisonous.

Potatoes, both sweet and white, are allied to several powerful narcotic plants, as well as to other esculents, such as tomato and eggplant. Potatoes consist almost wholly of starch, and accordingly deficient in nitrogen, and illy adapted for an exclusive article of diet; though, as an accompaniment to other heavy foods, they are very healthful.

The squash has great food value. Its properties are similar to those of the sweet potato. The carrot is a moderately nutritious food, with the same properties when used internally as when applied outwardly in the form of a poultice, allaying inflammation. Its chief value is in the form of a digester. It contains pectic acid, which acts upon other foods in a manner that dissolves them, and so promotes digestion. It is said that the frequent use of carrots will bring brilliance to the eye, smoothness and gloss to the hair, and clearness and color to the complexion.

The cucumber and muskmelon possess remedial qualities for rheumatism. Their juices are also valuable as an emollient for the complexion, in the form of lotions, cold creams or pomades.

The young shoots of asparagus have from remote time been held in high repute as a culinary vegetable owing to its delicate flavor and diuretic virtues. The ancient Romans served it at their most elegant banquets. No vegetable is more favorably known as a cleansing agent of the kidneys.

The cabbage family, of which there are many branches—namely, Brussels sprouts, one of the most delicate of table vegetables; the common drumhead, of which sauerkraut is made; the red cabbage, excellent for pickling; cauliflower; broccoli, a variety of cauliflower; broccoli sprouts and kale; besides numerous other varieties unfit for table use—adapted to the needs of animals. All contain a large percentage of nitrogenous

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compounds as compared with other articles of food. They are a mental and physical tonic, but unless eaten very fresh are difficult of digestion, and have a very decided tendency to produce flatulence.

The common bean is more nutritious than wheat. It is, however, a rather coarse food and difficult of digestion. Wax and butter beans, when cooked tender are wholesome and nutritious. The Dutch and Germans recognize their virtues and preserve large quantities in salt for winter and spring use. Peas are equally as nutritious and wholesome as beans. Very few appreciate the value of dry peas in a puree.

The watercress is a pungent stimulant with anti-scorbutic properties. Nasturtium pods have similar attributes to the horseradish and watercress. The medicinal qualities of the radish stimulate, cleanse and tone the system. Lettuce is especially healthful, because so easy of digestion. Added to these are laxative and soporific qualities, which make it a valuable salad for nervous people. Okra has a soothing effect upon the system.

Laxative properties are found in parsley. Spinach exerts a strong influence over the lungs and liver. Its seeds are often prescribed in the Orient for inflammation of the liver and to relieve difficult breathing.

The purgative properties of the onion recommend its frequent use to cleanse the general system. It especially promotes discharge from the mucous membrane of the lungs and trachea. Horseradish is a good local stimulant and a mental and physical tonic. Its frequent use will relieve a tendency to dropsy, and it contains properties that are beneficial to chronic rheumatism sufferers.

Rhubarb is a most efficient stomachic. By its use the stomach is strengthened and incited to healthy action. Its censorship over improper diet is important and beneficial, inasmuch as its laxative qualities cleanse the system of much effete matter.—Orange Judd Farmer.

THE FORMING OF FRUIT BUDS.

Often the question is asked, in what time of the year do such and such trees and vines form fruit buds?

Strawberries develop fruit buds in the fall for the next year's crop. Raspberries, blackberries, grapes and almost all of what are called small fruits form fruit buds in the spring. Apple trees and most all other trees form fruit buds in the fall, mostly during the months of July, August and September, owing to the season. In dry weather they will form buds earlier and often change fruit buds when not fully developed into leaf buds. Again, if trees get injured by rabbits, mice, borers, by too deep plowing or by plowing too close to the trees; thus cutting the many roots, etc., their growth is checked and their vitality injured, which causes

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the tree to form fruit buds. A tree very badly injured may leaf out in the spring, bloom very full, may half mature the fruit and die. Then most people are ready to say that the tree bore itself to death, when the death-blow that nearly killed it outright fell months before.

How to Make Trees Bear.—Apple trees six years old or over that do not bear nor develop fruit buds may have their growth checked. Watch the progress of the tree. After the leaves are fully grown is the time to check the growth to cause the formation of fruit buds. Different modes are practiced: Twisting a small wire tightly around the limbs, which must be removed in about six weeks; girdling by cutting or peeling a band of bark off one or two inches wide; pruning; stopping cultivation, or sowing to clover. The same applies to peach, pear, cherry or plum trees. I have seen peach buds form in the spring, but this is a rare case.

How to Grow Fruit for Exhibition.—When fruit is about one-third grown select limbs that have the best fruit. Pick off all except two or three specimens—only one is better. Twist a wire around the limb just below the fruit. This checks the downward flow of sap by pressing the bark, throwing the food back and the fruit appropriates it, causing an abnormal growth and speedy maturity. This may seem unreasonable, but trees take in their food from the soil—minerals dissolved in water—which passes from cell to cell through the center of the trees until its leaves are reached, where it is digested, so to speak, and is combined with carbon from the atmosphere, and the sap food passes downward immediately under the bark, building up the wood cells and nourishing the fruit.—Exchange.

CROSS POLLINATION OF ORCHARD FRUITS.

Although the theory of the importance of having some of our orchard fruit crossed in the blossom from the blooms of other varieties of the same species, to obtain better crops or better fruits, was not propounded very long ago, it has attracted much attention, and has been generally adopted by the leading horticulturists, because it gives a reasonable explanation of many problems that have been more or less difficult of explanation before.

When a man planted a commercial orchard of one variety that he thought to be productive and in good demand in the market, he could not understand why his trees should not yield as well as those of his neighbor, who had the same kind in a little orchard of a half-dozen varieties, intended more for home use than for market. When a tree bore a good crop on one side and set no fruit from an equally good bloom on the other, it was not easy to assign a reason for it, and when two scions from the same tree were set upon similar stocks of bearing trees in different or-

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chards, and varied much in quality or amount of fruit, it seemed unaccountable as it did when an old orchard had all but one or two favorite ones cut down or dug out, that the trees left should cease to be productive.

But when this question of cross pollination began to awaken attention about ten years ago it furnished a probable solution of all these puzzling questions. The absence of other varieties near the trees that failed to fruit explained those cases, while if the pollen was distributed by a strong wind there would be a reason why it should take effect upon the windward side of the tree and fail to reach the leeward or the center. If bees or insects distributed they would be more impartial, or a change of wind might bring pollen from another tree to the other side.

We do not remember which was the first to publicly publish literature upon this subject, Professor Bailey, of Cornell Experiment Station, New York, who devoted his study of it mostly to plums, or M. B. Waite, of the Agricultural Department at Washington, who studied pears more, and apples to some extent, but we think the theory had been advanced by a few of the leading horticulturists before either of them published anything on the matter, and with them it was rather a theory than a proven fact.

Since that time many have devoted themselves to studying these conditions, not only regard to plums, pears and apples, but to many other of our orchard fruits, and they have prepared lists of such varieties as are adapted for cross pollination or fertilization of blossoms, and much other information upon the subject that is likely to prove valuable to those who have planted orchards, or intend to do so. The list is too long, and yet not sufficiently complete for publication in a newspaper article at this time, but one or two general rules may serve as a guide. It is of the first importance that the two varieties selected for cross pollination should be in bloom at the same time. This is most especially necessary in those which retain their blossoms but a short time, as the plums, and with the apples there may be a variation of a few days, as the blossoms remain much longer.

It is also beginning to be realized that some, if not all, are better pollinated by varieties that are closely related, as one by another that is a seedling of it, and that, as in grafting, if the characteristics of the fruit are to be retained in the entirety, the stock should not vary in character from the graft, as the tree selected to furnish pollen for the blossoms of another should not vary much in its general character from the other.

Naturally, from this it follows that the character of the fruit may be modified by the pollen of the tree that stands near it, as some are by the stock the scion is set in. It may be made earlier or later, a better keeper, larger or smaller, more or less sour, according to the character of the fruit whose blossom furnishes the pollen. There is a chance for much study

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in this matter before a full knowledge of the subject can be gained, and private orchardists should investigate the matter and give the result of what they can learn by observing results where they have two or more varieties near together, and perhaps those who have but a few trees for a home supply of fruit may be able to do more than those who have larger orchards with less varieties or greater distance between the different varieties.

Probably very few of our trees are entirely sterile or barren when standing alone. We do not know that any, unless it may be some of the plums and grapes, have what are called in the strawberry imperfect blossoms, those of one plant being all pistillate or feminine, fruit-bearing blossoms, and the other all staminate blossoms furnishing pollen to fructify the others. In fact, this condition is very rare in strawberries, there being few entirely barren when grown alone, though practically so as far as profitable production goes.

In the plums more than in any other of our orchard trees have been found defective blossoms. In some the pistil, which should form the fruit, is entirely lacking. These will be always barren, at least if all the blossoms are so. In some the stamens and pistils do not develop at the same time, or the pistils are longer than the stamen, so that the pollen from that blossom can not reach it. These can only become impregnated by the pollen from other flowers.

While in some cases, as we said before, the wind conveys the pollen from one tree to another, this is but an uncertain method, as it "bloweth where it listeth," and neither time nor direction can be depended upon. Bees are more reliable, but when there are many bees of one variety in a solid block, they may for some reason limit themselves to that variety alone, and thus not carry to it any pollen from another variety, though it is but a little distance away. This is probably also true of other insects. The pollen of apples, pears and plums is sticky and does not move much with the wind, yet with apples and pears the pollen is so abundant that three or four rows of one kind may usually be safely planted, especially if bees are kept near them. Some would say two or three rows of plums, but we should feel more sure of fertility if each row was of a different variety from that next to it.

The nearer the fruit comes to a natural state, or as a seedling, the greater the chance of its being self-fertilizing, or having a perfect flower, and thus trees standing alone, that have not been grafted, often bear heavily. If it is desired to graft such a tree a few of the top branches should be left untouched that they may furnish pollen for the blossoms on the graft.

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We used to know as a boy wild grape vines that blossomed full, and were very fragrant every year, yet never bore a grape. They were known as "he" vines, but we were not able to tell then whether the blossoms were strictly staminate or not, and we were more interested in locating the vines that bore good grapes than in those that had none. Cross pollenization between two different species, as the pear and apple, may occur, but we have no authentic proof of such cases.—American Cultivator.

POTASH IN FRUIT CULTURE.

As far back as my recollection extends, the orchards of southeastern Ohio were situated on the river bottoms. On the Muskingum and the Ohio rivers the earliest orchards were planted on the first plateau, which is generally not more than 10 or 12 feet above the low water mark. The soil of this plateau was originally very rich; it produced aspens, beeches, poplars, and occasionally a Carolina poplar. But trees growing in this rich alluvial soil were soft-wooded and did not make durable timber.

The apple trees on these bottoms grew to an enormous size. I remember an Early Chandler which, I think, was 60 feet high. An apple falling from the top and striking the hard ground would burst to pieces. Neither did the apples keep well. There was too much vegetable matter in the soil. Our Putnam Russets seldom lasted through February. The old orchard served a good purpose in its day by protecting the houses on the bend from broken ice in the spring flood. But the soil it occupied was valuable for corn, the old trees were cut down and their stumps, though often two feet through, rotted out of the way of the plow in about five or six years.

The second orchard had been planted on the slope of the fourth plateau, a yellow clay loam; and it came to be a matter of remark in the family that the apples from this kept better in the spring than those from the old orchard. The fruit was better flavored. We did not know much about potash in those days, but we knew that a Rome Beauty tree, planted on the inside of an immense hollow walnut stump, where the soil had been enriched with ashes, produced exceptionally fine, hard, long-keeping apples.

Later on hogs were allowed to run in this orchard the year around. They rooted it so energetically that sometimes laterals six inches in diameter were wholly above the surface. The vigorous rooting, the destruction of all unsound and wormy fruit, and the heavy manuring, made an enormous yield of fine, smooth, large apples every year. But again it became a subject of remark that they were not keeping as well as they should; they were too much like the apples from the old orchard in that respect.

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They were receiving too much animal manure. The trees grew too rankly, their wood was too soft. One night a cyclone went through diagonally and cut a narrow swath clean; every tree snapped like a pipe-stem. They had needed potash to make them hard and to make the fruit long-keeping and give it character. But even then we had no clear idea what the matter was, and we decided on one more removal.

The third orchard was planted quite off the river plateaus, 300 or 400 feet above the river level, on a hill of which the north side was very red clay and the south side yellow clay. The trees on this south slope were planted among the ledges, we sometimes used the crowbar in making the holes and scratched around for enough fine earth to cover the roots. As the roots grew they wormed in and out among the stones and sometimes could not find earth enough to hide themselves in. The soil was largely decomposed rock. It was pretty thin and the trees grew low and wide, only half as high as those on the red-clay side. On the poorest stony knobs we applied the ashes of the burned brush heaps. But the fruit was choice: it was the finest that had ever been produced on the farm. On these river hills, so steep that we had to roll the barreled apples diagonally down hill to get them to a wagon road, the fruit was far superior to that grown on the rich river botton. It had character, did not take so much sugar in cooking, had a firmer texture, kept better, had a higher color.

It is pretty safe to assume that potash was the principal element which so differentiated the apples of the river bottoms from those of the hills. The first plateau, being of recent formation, is largely silt or decomposed vegetable matter carried down in the water of the river, and therefore bearing a low percentage of potash, as shown by the fruit trees growing there. But in all heavy clay uplands there is from 0.5 to 0.8 per cent of potash, which is sufficient to influence very materially the quality of timber and fruit growing on it.—S. Powers, Ohio.

BUDDING FRUIT TREES.

The difference between grafting and budding fruit trees consists principally in the amount of material used; the result being the same. In grafting, a piece of a branch with a number of buds is inserted into another branch, while in budding only a single bud, with a little bark, and perhaps a little adhering wood is used. This bud is inserted under the bark of another tree and upon the face of the newly growing wood. This operation must be done while the stock is in a state of vigorous growth, or while the sap is flowing freely, so as to allow the bark to peel readily. The exact date depends upon the kind of species of tree to be worked;

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beginning with apples and pears and ending up with peaches. Frost sometimes catches the budder before finishing the peach stocks.

There are various methods of inserting buds, but the one commonly practiced is done by first selecting a smooth spot about two or three inches above the ground, and then making an incision lengthwise through the bark of the stock an inch and a half or two inches long, and then a small cut at right angles across the top, the whole somewhat resembling the letter T. A bud is then taken from the present season's growth by shaving off the bark with the bud about an inch in length. A small amount of wood will adhere to the bark, and this may remain if it is not too old to allow of the parts uniting readily. The corners of the bark at the T are then raised slightly and the bud pushed well down underneath the bark. A bandage, consisting of ordinary wrapping string, or raffia, which is commonly used, is then wrapped around it, covering the parts both above and below the bud, giving it just pressure enough to keep the inserted portion closely to the stock, but not close enough to check circulation.

The shoots from which the buds are cut should be quite firm in texture. The leaves should be immediately cut off to prevent evaporation, leaving a quarter or half inch of the foot-stalk to serve as a handle in placing the buds. In ten days or two weeks they should be examined, and if string has been used in tying, it should be cut in order to prevent choking the bud. If union has taken place, the bud will appear fresh and green, although it should remain dormant until the next spring, when the stock is cut off a short distance above the bud and the whole vigor of the root thrown into the new bud which is to form the tree, and which should grow from one to three or four feet the first season, depending upon the kind of tree.

The points to bear in mind, then, in successful budding, are: first, a thrifty, rapidly growing stock, so that the bark will peel freely; second, the proper time, not too early until some growth has taken place, and not so late that the bark will not peel; third, healthy buds sufficiently matured; fourth, a sharp knife, so that the bud may be shaved off smoothly; and fifth, the application of some ligature firm enough to cause the bud and stock to fit closely.—J. Troop, Purdue University.

ADVICE TO BEGINNERS.

There are none who see brighter visions in the future than the beginner in fruit culture, and there are none who get a taste of higher flavor, of the bitter ashes and sour apples than he. A good start is always counted as half of the battle, whether it may be with guns or apples. As a fact of history, you may set it down that the starter in

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fruit growing, at the end of a few years' work will be wiser if not richer. The beginner in fruit growing should know his land and location. His land must not be poor, and his location must be not in a swamp or on a dry, poor hillside. Tree or vine, or cane, fruit will not grow and do well if it is not properly situated and properly fed. After you have got and prepared a place for your fruit home and farm, then comes the preparation of the soil. Have it rich enough with plant food to feed and keep fat the crops you plant. No little bird or big book can tell you what to plant and when to plant. You must learn these things largely by observation and consultation.

To raise fruit and succeed, the man that does it must love fruit; not merely for the money in it, but the good eating in it. The man who loves fruit because it is good to his taste is best to raise fruit to sell. The man that loves his wife makes a good husband. The man who loves fruit can make a good fruit raiser. No matter connected with fruit growing is more important than the selection of varieties and kinds. Apples won't grow south of the Georgia line and oranges won't grow north of the Florida line. Take a hint right here—it is not safe for the beginner to depend on nursery catalogues, or even State society reports. This matter of fruit raising is to be largely determined by location, soil, climate and brain and brawn of the man behind the plow and at the end of the hoehandle. The fact is, I have been a beginner for over thirty years, and am yet a beginner, from the fact that there is more that I don't know than I do know. The man who may say, "I know all and enough," is a fool or a liar. The orchard, the garden, the vineyard and the truck patch is open to the beginner. This makes a big field to cover with elbow grease and head work. The world must have fruit and they get it, but the producer oft at the season's close, goes and sets down at his fireside with a heavy heart and a light purse.

The beginner should be very careful in the selection of varieties. For myself I can say that thirty years ago I planted a thousand pear trees of more than a dozen varieties, and not over one-fifth paid for planting in fruit. I will say this: That I know of no other business that has as much pleasure and as much fun and hard work and as little money in it as fruit growing. This don't apply to all sections of our big country, but to sections only where the business is not properly organized and conducted. When I was a "starter" thirty years ago in fruit raising I consulted the books, catalogues and my neighbors as to what I should plant and how to plant it, and care and cultivate; but I got such mixed advice and such questionable information from print and talk that for several years my income was more from experience than money. Experience brings knowledge, and maybe wisdom, and the man who lives and don't

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learn is an odd count, and a misfit, and should not go into the fruit business to make money.

Whether you start to raise fruit for market or home use, have a care of the tree peddler, for he has fooled people from Adam's day to this day. Get your trees and plants from your nearest nurseries, if reliable. If you do this you will save money and disappointment and trouble.—W. Cook, Rural Neck, Ky.

MAINTAINING FERTILITY OF FRUIT LANDS.

The cowpea is a good crop to add fertility to the soil. It is a summer crop, a bean and a very tender one. It should not be planted until the ground is thoroughly warm or until late corn planting time. It is the strongest growing legume and will sprout and grow in any soil, no matter how poor. Broadcast one bushel per acre or drill in one-half bushel or less of seed. Plant with a bean or seed drill in rows two and one-half feet apart. The cowpea will grow wherever corn will grow. It may not mature, but the early varieties will nearly do so. The Little Black Whippoorwill or New Era will mature in this latitude if planted in June and will make green pods by frost, if planted in July.

Buckwheat is not a nitrogen gathering plant, but will add a good deal of humus to the soil. It should be sown late after cultivation has ceased. It makes available a lot of plant food already in the soil. Turnips are another good crop to add humus to the soil and will thrive where it is not too shady. The soy bean takes about as much time to mature as an ordinary corn crop and is somewhat later than cowpeas. If sown early in June, they will mature a good crop of seed. The pods all mature at the same time, but when the plant is ripe the stalks are as hard as hickory brush. It will not do as well in the shade as cowpeas.—H. E. Van Deman.

HEADING YOUNG APPLE TREES.

There seems to be an increasing desire for information as to the better ways of heading young apple trees. So says the writer, in Rural New Yorker. The practice of some has been to head them from four to five feet high in the eastern States, that it may be possible to drive teams under the trees in cultivating the land about them. But there seems to be a change gradually coming over the orchardists of that region in some degree, and the tendency is for lower heads. In the central and western States there is much less of this practice, and, perhaps, because of the more intense and longer continued sunshine and the more advanced ideas

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that prevail. The reasons for low-headed apple trees are properly stated about as follows: The lower the heads the less purchase the winds have upon the roots, and the less liability to leaning and blowing over. The lower they are the more easily and cheaply they can be sprayed. The same is true regarding pruning. The fruit on low-headed trees is easier to gather than on those with high heads. On the other hand, the lower the branches the greater difficulty there is in tilling the soil under them, but there are tools made with extension frames that largely obviate this. Another very important matter is the form of the head. Some have held to the theory, and practiced it as well, of training the tops into vase form, or at least with very open heads. It is often that the main branches all diverge from one point, and sometimes the entire weight of the top comes upon one or two forks. This occasionally causes splitting and consequent loss or very serious injury to the trees when loaded with fruit or sleet. These open heads are likely to induce the flat-headed borer to work upon the large branches, where that insect abounds, and sometimes sunscald is also invited. The more approved form is that which approaches the pyramid style. This requires the main branches to come out on all sides, and continually, from a central stem. This divides the strain on the branches and forks and gives better opportunity for the air and light to reach all parts of the tree than where the branches come out from one place. The manner of growth of a pine tree should be the ideal, although this is not possible to attain entirely, because of the natural difference in the habits of growth of the pine and apple; but it should be approached as nearly as possible. There is rarely any danger of getting the central stem too tall, for the natural tendency is for it to stop and be merged into the spreading branches. If any tendency to too high a center should appear it is easy to check it by cutting back the stem. As the tree approaches bearing age the upward growth becomes less pronounced, and there is little occasion with most varieties to head back the top. The weight of fruit also tends to hold back and spread the tops of old bearing trees. One of the main points to be most carefully and faithfully guarded is the proper forming of the head while the tree is very young. If the orchardist is able to understand his trees and forsee their future shapes he may avoid much cutting of large branches when they get old. To be able to do this one must know the peculiarities of each variety he plants. Some will need higher heads than others, and different training. When trees are first set the future form should be in the eye of the planter, and such branches as will finally be out of place should be cut off at once. In no case nor in any climate should the stem of an apple tree be cut out, but it may be cut back moderately, to correspond with the outer branches, which should also be cut back from one-third to one-half. Direc-

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tion can be given to the shoots at the ends of these cut branches by being careful to have the last bud on the side toward which it is desired to grow. The more severe the cutting the stronger will be the succeeding growth. During the first few years of the life of a tree the rubbing out of sprouts and cutting away of small branches that are not needed will have a very beneficial effect upon its after life. Train up a tree in the way it should grow, and when it is old it will not be far from what it should be.—H. E. Van Deman.

WASH FOR PEACH-TREE BORERS.

Professor Smith, entomologist of the New Jersey Experiment Station, reports satisfactory results with cement and milk applications against the peach tree borer. All the peach trees in his experimental orchard have been treated since they were first set with one or two annual applications of hydraulic cement mixed with skimmed milk. Enough cement is added to the milk to make a thick wash, which is applied with a brush. The soil is removed from the crown, which is examined closely to see if any borers are in the tree. The application is made to cover the trunk nearly up to the branches. After the cement has set thoroughly, the earth is turned back around the trunk, so that about two inches of the cement covering is below ground. This application has been effective. Hardly any borers have been found after the first year, and that this is not because there are no moths about is proved by the infestation of trees in neighboring gardens. Where only a few trees are to be protected, or where the trees are young, Professor Smith says he knows of nothing that is more satisfactory. It is easily applied and lasts the entire season. A little judgment must be employed in getting the mixture to a proper thickness; but if one coating does not seem sufficient, it is easy to apply a second. The trunks should be wet when the application is made, because the cement sticks better. Milk is better than water for mixing because it gives a more flexible covering. It does not crack or split off as easily as when water is used. On small trees the application costs very little. On larger trees it is much more expensive than newspaper coverings and not so effective.—Western Fruit Grower.

SPRAYING FOR THE SAN JOSE SCALE LOUSE.

Various mixtures have been proposed for this insect and a number have been found to be more or less effective. It is hardly possible, however, to apply any remedy with such thoroughness as to reach every scale, and because its natural enemies are few and its rate of reproduction very

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rapid, complete eradication is practically impossible, but by treatment each season it is entirely practicable to hold it in check. The choice of a compound with which to make treatment is not to be determined alone by its efficiency, but by its availability and practicability as well. Resin washes, composed of resin, potash and fish oil, have been found to be efficient, but are troublesome to prepare in a small way. The same is true of a white wash made of lime, sulphur and salt. Whale oil soap, when used as strong as two pounds to a gallon of water and applied with thoroughness, is a good remedy. Its cost precludes its use in many cases and the difficulty of finding suitable weather conditions for the application of it make results with it quite variable. While not without objections, crude petroleum has been found, in most cases, to meet the requirements better than any other remedy yet tried at the Ohio Experiment Station. The thin, light grade is safer and less troublesome to use than the thick, heavy grade, although when diluted with water the latter is less objectionable than if used clear. Refined oil is more harmful than crude.

Good results have been secured in spraying scale infested trees with 25 per cent. of crude petroleum and water, also with higher percentages of oil. Trees have been injured and even killed with 25 per cent. of oil. On the other hand, many thousands of trees, in all parts of the country, have been sprayed with clear crude petroleum and with various percentages, without injury. The manner of spraying has much to do with the effect upon the tree. When the material is applied in such quantities as to run down the limbs and bodies of the trees injury is almost sure to occur, even if the oil is diluted with water. Sometimes the operator, trusting to dilution to prevent damage, sprays excessively, or until the mixture runs down to the roots. The oil is thus unevenly distributed and unknown quantities reach certain parts of the tree, resulting in local injury. Peach trees are very tender and should be sprayed with more than ordinary care. If whale oil soap is used the work should be done just as the buds are swelling. The only safe way is to stop spraying before the material begins to run, and this rule applies to diluted as well as to clear crude petroleum. With a suitable pump, 25 to 50 per cent. crude petroleum can be used safely and economically, but if this pump can not be relied upon to give accurate percentages, then clear crude petroleum may be applied with any pump. A nozzle which will give a fine spray is needed in all cases. Choose a day for spraying with crude petroleum when evaporation is rapid, as greater injury is done in damp than in drying weather. If the sun shines and the wind is blowing all the better. A light wind is not advantageous, but a brisk or high wind assists operations materially. When there is no wind begin at the top of the tree, spraying around the

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careful to have the last bud on the side toward
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REMEDY FOR CODLING MOTH.

ing experiments here noted were made upon Winesap apple
eighteen years old and from fifteen to twenty feet high. Just
blossomed the trees were sprayed May 4 with Bordeaux mix-
The next two sprayings, those in which poison was used, were made
15 and May 20. The first just after the petals dropped and the last
before the calyx closed. In both experiments the poisons were
with Bordeaux mixture, made by the 4-6-50 formula. Five trees
were left untreated. All the trees had been sprayed regularly for many
years. The season was a severe one for a test of remedies. In 1900 there
was a good crop and plenty of codling moth; while in 1901 there were
practically no apples on the peninsula. As a result codling moths concen-
trated largely in orchards bearing fruit. Five trees were sprayed twice
with arsenate of lead, known also as disparene. Three were sprayed
once only, May 15, with disparene. Five were sprayed with paris green,
one pound to 150 gallons Bordeaux. The droppings were carefully col-
lected and both good and wormy fruit counted during the season.

The number of perfect droppings is approximately the same on all
trees. One spraying of disparene was as effective as two of Paris green,

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while tw 'ds for a distance of about ten feet from a partially de-
, be ver ne of these same strands was followed, at an average
'k to ce of the soil of ten inches, where it was found
, ra 'living 'Ben Davis' apple tree. None of the other
a 'ased, and it was plain that the first entrance
'ade at this point, out on one of the smaller
trunk of the tree.
the tree is generally made by the my-
'l root, yet cases were found in which
'e crown of the tree first, and then
'd up into the trunk. As a rule,
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[Arsenate of lead or disparene, mentioned in bterranean
article, can be easily made on the farm if desirable. The co bout ten
(1) arsenate of soda and (2) acetate of lead. When combined the ditch
the arsenate of lead. Dissolve four ounces arsenate of soda in alls.
quarts water and eleven ounces acetate of lead in another three quarts s
water. It dissolves readily and can be diluted either with Bordeaux mix-
ture or water. In either case about one quart arsenate of lead should be
used for each twenty or twenty-five gallons Bordeaux or water. It should
be mixed as used. It can be used much stronger without danger to foliage,
even on peach and plum. In this respect it is superior to paris green and
other arsenical poisons, as it does not burn the foliage. As a rule the for-
mula given will do for most leaf-eating insects, and the codling moth.
Where rapid work is desired the quantity can be doubled; that is, use two
quarts or even more arsenate of lead in twenty to twenty-five gallons solu-
tion. Arsenate of lead does not dry, but forms a pasty precipitate almost
pure white. It remains well in suspension and does not need the constant
agitation required in Bordeaux or water where Paris green is used. Usually
arsenate of soda costs about 8 cents per pound and acetate of lead about
14 cents. In other words, when these chemicals are combined, arsenate of
lead costs, when homemade, about 14 cents per pound.—Ed.]

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tree and work downward rather than upward. Avoid double applications, such as may result by spraying up and down the tree. If the wind is brisk hold the nozzle high and let the material drift through the trees. In this way trees some distance away may be covered almost as well as those nearby. The operator must shift his position and change the height of the nozzle as experience shows to be necessary. When the wind changes another application must be made on the other side of the trees. There is less danger of overspraying in a high wind than when the air is calm, but there is also a greater probability of missing parts of trees. In early spring, just before the buds open, is the best time to spray, although no harm may be done if the work is performed earlier. The work can be done much better if the trees are first severely pruned by cutting off the ends of the branches. In case trees are seriously infested this operation is necessary in order to secure good results, after removing one-third or one-half of the top. Peach trees will endure very close pruning and no harm will be done if the top is all cut away and a new one started. Close pruning also assists the trees to recover from the weakening effects of the scale. It is seldom advisable to destroy trees because of infestation, but it is usually better to prune and treat than to dig out, because new trees put in place of the old ones would soon become infested.—W. J. Green, Ohio Experiment Station.

VALUABLE REMEDY FOR CODLING MOTH.

The spraying experiments here noted were made upon Winesap apple trees about eighteen years old and from fifteen to twenty feet high. Just before they blossomed the trees were sprayed May 4 with Bordeaux mixture. The next two sprayings, those in which poison was used, were made May 15 and May 20. The first just after the petals dropped and the last just before the calyx closed. In both experiments the poisons were used with Bordeaux mixture, made by the 4-6-50 formula. Five trees were left untreated. All the trees had been sprayed regularly for many years. The season was a severe one for a test of remedies. In 1900 there was a good crop and plenty of codling moth; while in 1901 there were practically no apples on the peninsula. As a result codling moths concentrated largely in orchards bearing fruit. Five trees were sprayed twice with arsenate of lead, known also as disparene. Three were sprayed once only, May 15, with disparene. Five were sprayed with paris green, one pound to 150 gallons Bordeaux. The droppings were carefully collected and both good and wormy fruit counted during the season.

The number of perfect droppings is approximately the same on all trees. One spraying of disparene was as effective as two of Paris green,

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while two of the former were much superior to the latter. This seems to be very largely due to the superior adhesive qualities of disparene. It stuck to the leaves all summer although we had unusually numerous and severe rains. We have carefully gone over the records of previous experiments, and considering the unusual number of codling months present, the check trees having 60 per cent wormy for the whole season, we believe that the results secured by two sprayings with disparene are the best that have yet been secured in any similar experiments.

The two sprayings with disparene resulted in reducing the number of windfalls a half and increasing the perfect picked fruit by 18 per cent. over those sprayed but once. A benefit of 87 per cent over the unsprayed trees was thus secured as regards wormy fruit, there being but 7.8 per cent. wormy during the whole season, and but 4 per cent. of those picked, and a benefit of 77 per cent. as regards windfalls. The labor and Bordeaux mixture for each spraying was a trifle over 2½ cents per tree, including the disparene. Where Paris green was used, the cost was about 2¼ cents per tree. Disparene can be made at home. It costs about 15 cents in one hundred-pound lots and about 20 cents in five-pound packages. It was first used in Massachusetts against the gypsy moth.—Orange Judd Farmer.

[Arsenate of lead or disparene, mentioned in Professor Sanderson's article, can be easily made on the farm if desirable. The constituents are (1) arsenate of soda and (2) acetate of lead. When combined they form the arsenate of lead. Dissolve four ounces arsenate of soda in three quarts water and eleven ounces acetate of lead in another three quarts water. It dissolves readily and can be diluted either with Bordeaux mixture or water. In either case about one quart arsenate of lead should be used for each twenty or twenty-five gallons Bordeaux or water. It should be mixed as used. It can be used much stronger without danger to foliage, even on peach and plum. In this respect it is superior to paris green and other arsenical poisons, as it does not burn the foliage. As a rule the formula given will do for most leaf-eating insects, and the codling moth. Where rapid work is desired the quantity can be doubled; that is, use two quarts or even more arsenate of lead in twenty to twenty-five gallons solution. Arsenate of lead does not dry, but forms a pasty precipitate almost pure white. It remains well in suspension and does not need the constant agitation required in Bordeaux or water where Paris green is used. Usually arsenate of soda costs about 8 cents per pound and acetate of lead about 14 cents. In other words, when these chemicals are combined, arsenate of lead costs, when homemade, about 14 cents per pound.—Ed.]

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ROOT ROT OF FRUIT TREES.

The Oklahoma Experiment Station has published a bulletin summarizing an investigation of a serious root-rot disease which is destroying many fruit trees in the orchards of the State. The disease has been noticed in many localities and seems to be confined to lands that have been cleared of timber before planting to trees.

The symptoms of this disease are so characteristic that no one should experience any great difficulty in correctly diagnosing any suspected cases. Perhaps the most characteristic effect of the attacks of this fungus is the great exudation of gum about and from the crown of the diseased trees. This flow of gum occurs in maple, peach and cherry trees and is reported for the apricot tree. It frequently happens that the amount of this gum to exude is so great that it unites with the soil about the base of the tree to such an extent as to form a mass of cemented soil about the tree. In many cases this mass of gum-cemented soil will become hardened to form a sort of cast about the crown and larger roots of the tree.

"The yellow coloration of the leaves is usually one of the prominent symptoms of the disease. In many cases, however, the leaves wilt rapidly during the growing season instead of becoming yellow. This rapid wilting of leaves is the first external evidence afforded that the root system of the tree and consequently its absorptive ability have been greatly reduced.

"The groups of mushrooms found about the base of the trees will afford the most positive evidence of the presence of this disease. But unfortunately this evidence comes too late for the application of any remedial agent; for the mushrooms seldom appear about the crown of the tree until the disease has so far progressed that no preventive or remedial measures can be applied.

"The fungus of this type is well provided with means to insure its rapid distribution throughout large orchards. The spores, that are produced in such large numbers, are easily scattered about and each one may, under proper conditions, give rise to a mycelium and the typical sporophores. Perhaps the beetles that are often seen eating the old pilei are of some value in distributing the spores, but this point needs some further investigation.

"The most fertile source of infection is certainly found in the several sorts of mycelial strands produced by this fungus. The subcortical mycelium is an old stump or even a diseased tree may give rise to the purplish-black rhizomorphic strands, and these will grow out in the soil to a considerable distance. In one case the author was able to trace these

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subterranean strands for a distance of about ten feet from a partially decayed oak stump. One of these same strands was followed, at an average depth under the surface of the soil of ten inches, where it was found entering the cortex of a living 'Ben Davis' apple tree. None of the other roots of this tree were diseased, and it was plain that the first entrance of the mycelium had been made at this point, out on one of the smaller roots at least six feet from the trunk of the tree.

"Though the first entrance to the tree is generally made by the mycelium through the cortex of a small root, yet cases were found in which the mycelium had evidently entered the crown of the tree first, and then spread out through the smaller roots and up into the trunk. As a rule, the mycelium does not grow up in the trunk above three feet from the crown. In fact, in many cases no trace of the mycelium can be detected in the trunk more than five or six inches above the crown.

"The greater part of our knowledge concerning the proper remedial measures to be applied against this and other wood-destroying fungi is derived from the wide experience of the foresters of Europe. Among the strictly remedial measures none are of greater importance than the isolation of diseased trees by ditching. If a single tree in the middle of the orchard is found to be diseased, a ditch should at once be dug around it to prevent, if possible, the further spread of the disease by the subterranean mycelial strands. This ditch should be dug at a distance of about ten feet from the tree, i. e., with a diameter of about twenty feet. The ditch should be about one foot wide and about two feet deep with vertical walls. The same measures are to be adopted to protect a group of diseased trees that are found in the orchard. In this case the ditch may be dug so as to include all the trees in the group. It is possible that the burning of brush in this ditch will kill the rhizomorphic strands and prevent further spreading. So far as the author is aware this method has never been practiced to any great extent in America, though in Europe it seems to have proven effective in combating this and similar diseases.

"It can not too strongly be insisted upon that all fruit trees that are found to be diseased should at once be removed from the orchard. Care must be taken in such cases to remove and burn not only the trunk, but all the larger roots and especially all those diseased. Perhaps a tree will bear salable fruit after the mycelium of this fungus has entered its root system, but it is a near-sighted system and poor business to allow such a tree to stand when it is remembered that thereby all the other trees in the orchard are being endangered.

"Too great care can not be taken to avoid cutting or otherwise injuring the roots of the trees by plowing or other cultivation. Though the mycelium of this fungus is able to enter the cortex of perfectly healthy roots,

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yet its progress, as well as its entrance, is greatly facilitated by wounds of any character. In one of the orchards visited by me last fall it was apparent that in some cases the mycelium of this fungus had first entered the roots through wounds made by the plow in cultivating between the rows.

"Attention has frequently been called to a practice among some fruit growers of placing in the bottom of a hole, in which they are about to set a tree, a quantity of chips from their wood pile. In many of these chips there are sure to be found some of the mycelium of this fungus and the introduction of the disease into the orchard is the result of this practice in many cases. For it is a well-known fact that each small piece of mycelium of this fungus is capable of remaining dormant for long periods and of again producing, when placed under proper conditions, the mycelium and even the normal sporophores of the species.

"It was early found in these investigations that the disease was largely or entirely confined to those orchards that were planted on recently cleared timber land. In fact, the disease has never been reported in this State from orchards planted out on real prairie soil. Subsequent investigations have afforded abundant proof that the fungus described in this bulletin is common as a parasite and also as a saprophyte on various species of oak in this State.

"Old oak stumps or even dead oak roots remaining in the soil are apt to become fertile sources of the infection of the healthy trees planted in that same soil. From the above it follows that it is the part of wisdom to remove all old oak stumps from the orchard and to dig up all roots of such trees remaining in the soil. These should be carefully burned and in no case allowed to remain on the surface of the soil.

"From the nature of the disease the application of any fungicide as a remedial agent can not be recommended at all. And there is much doubt if their application to the soil will effectually prevent the spread of the mycelium through the soil from diseased trees or stumps. This is made probable from the fact that these fungicides are apt to lose their effectiveness in the soil through chemical combinations with other things present in the soil.

"It is very doubtful if any great good will result from 'liming' of the soil or from mixing a large amount of wood ashes with the soil. Neither of these methods would be of the slightest value as remedial methods, and further tests must be made before any value is ascribed to them as preventives of the further spreading of the mycelium.

"And though thorough cultivation of the soil is always to be recommended for other reasons, yet this may not tend to greatly reduce the spread of this disease. The thorough cultivation of cleared timber land

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in other crops before planting an orchard is, of course, to be commended. Perhaps in this fashion the fungus may simply be cultivated out of existence.

"In view of all that has been said, it is plain that it is not advisable to replant trees in holes from which diseased ones have just been removed unless perfect precautionary measures have been taken to rid the soil of all traces of the mycelium. And it is even doubtful if new trees should ever be planted out between the rows of diseased ones.

"And, finally, all sporophores that are found should be burned. The search for disease-resisting varieties will probably prove a failure and is a method that has in similar cases not yet proven itself entirely practical. The fact that this fungus and other similar ones are found as parasites on such widely different species as noted above would of itself discourage the attempt to secure a disease-resisting variety."—Exchange.

BLACK KNOT OF THE PLUM AND CHERRY.

The opinion is quite prevalent among farmers and many fruit growers that the disease known as black knot, so often found upon plum and cherry trees, is caused by certain insects. It is true that we may often find upon cutting open these knots the larvae of certain insects, but it is a universally recognized fact among those who have given the matter careful attention, that these unsightly, knotty excrescences are due to a special fungus which is almost always confined to the plum and sour cherry. The insects are there, because they find these knots to be good breeding places. The swellings are first noticed in early spring, often as soon as growth begins. They are then of a yellowish color, but get darker with age. In May and June a crop of spores, which answer to seeds in higher plants, appears on the surface of the knots, resembling to the naked eye a soft downy covering. This soon disappears, when the knots continue to get darker until winter, when they have the characteristic black color, which makes them so conspicuous at this season of the year. If examined carefully late in the fall, the surface of the knot will be found to be covered with a great many minute pimples or elevations, each one of which is a fruit of the fungus in which the winter spores are contained. These are in turn distributed later on, and find a lodging place in the crotches of limbs and in the openings of the bark, and at the junctions of the annual growths. As these spores germinate they send their vegetative organs into the growing tissues of the branch causing swellings, which often extend along the branches four or five inches. These vegetative tissues do not all die during the winter, but some live over and so new swellings,

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at the edges of the old ones, may be seen the following year. In this way the branch may continue to be infested until finally it becomes completely surrounded, when the circulation is cut off and the branch dies.

When these knots appear upon several branches at the same time, it is only a question of a very short time before the tree will die. The treatment generally recommended is to cut off the knots and burn them, which is a good thing to do, if it is done before the winter spores have been distributed. If not, then some additional treatment will be necessary. It is recommended, therefore, that all knots be cut off and burned during this month (February), and in addition to this, spray the trees with a strong solution of Bordeaux mixture during the first warm days of spring. About the time that buds start, spray again with the ordinary strength of Bordeaux mixture. This ought to destroy all the winter spores. Then in case the branches may have been already infected the previous year, they should be sprayed again during the latter part of May and the first of June. The young knots may be destroyed by painting them with chloronaphtholeum or with pure kerosene oil. Whenever these remedies are thoroughly applied, there will be no trouble in controlling the disease providing all old, worthless trees have been cut out and burned and providing, also, that the people of the entire neighborhood co-operate in this plan of action. Wherever the Damson plum is grown this disease is almost sure to be present; and as it is one of the "injurious plant diseases" referred to in the Indiana inspection law, the necessity for prompt action on the part of all owners of infested trees will be evident to all.—J. Troop, Purdue Experiment Station.

BROWN ROT OF PLUMS.

The plum trees owned by D. R. O. are affected with what is commonly called brown rot. This attacks many of the stone fruits. The cherry is seriously affected at times. In 1892 I observed one-third of the crop of Early Richmond affected near Dubuque. Earlier the same season the disease affected the flowering shoots of our Americana plums and the flowering almond as well. It is common on the peach, frequently destroying a good share of the crop, some varieties being much more seriously affected than others.

In the plums mentioned above, the season was a very favorable one. Cold, wet weather during the blossoming period soon caused the fungus to spread over the entire tree, with the result that no fruit set that year. It attacked the petals, pistils, stamens and leaves. Usually, however, the fungus attacks the fruit about the time the plums are ripening, especially during rainy weather. The spores of the fungus, which are contained

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in the chocolate brown masses, are carried by the rain, or when dry are blown by the wind. It is not infrequent that the loss to the crop is fully 50 per cent.

In the case of the young branches and flowers being attacked in spring, it is easy to observe that the old mummied plums convey the disease. These should be carefully removed from the tree in the fall and the trees sprayed with a solution of copper sulphate in the following proportions: Copper sulphate one pound, water twenty-five gallons. This treatment should be given before the buds open. This is an important treatment, as it destroys the spores of the mummied plums. It has also been shown that the disease can be prevented by spraying with Bordeaux mixture in the following proportions: Copper sulphate six pounds, strong fresh line four pounds, water twenty-two gallons. It will be necessary to make at least four applications, three with Bordeaux mixture and one with copper sulphate.—Prof. L. H. Pammel, Iowa.

MAKING CIDER AND VINEGAR.

The gale of September 12, that swept through New England after creating such terrible havoc and loss of life a few days before in Texas, has stripped a great deal of fruit from the trees in such immature, half-grown condition that it will not be fit for market or even for home use, as the fruit probably will not ripen properly or even keep long. It makes many of the farmers regret that the old cider mills which used to be found not far from every large orchard have been taken away or allowed to go to ruin, for many a cask of cider might be made from the fruit on the ground, even in small orchards.

We will not discuss the question of the use of cider as a beverage, whether it is as bad as stronger drinks, whether it helps to create an appetite for such, or whether it can become a more wholesome and reasonably safe substitute for them for those who crave some stimulant. The arguments upon these questions have been many times repeated without changing the minds of many either way. We propose to look upon cider merely as a preliminary process in the making of a pure fruit vinegar, which nearly every one wants as a condiment with certain articles of food.

We know that a considerable part of the vinegar sold and used in this country is not a fruit vinegar, but is manufactured from slops of various kinds, strengthened often with acids which are injurious to health or would be if the vinegar were used in more than small quantities and frequently. The hurtful effects of pickles may more often be ascribed to the acid in which they are put up than to the article that has been pickled. Such vinegars will undoubtedly be condemned and prohibited

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when the pure food law is enacted and enforced, and there will be a better demand for fruit vinegar, and for pure apple cider from which to make it.

To make good cider we need good, sound fruit, and if the cider was to be used as a beverage it would be better that the fruit should have ripened as much as is possible without having begun to decay. For vinegar this is not so important, although we doubt it very immature fruit makes vinegar as good as more mature fruit. It may contain as much acid, however, and we do not know that it is any less wholesome. We do know that early made cider usually will pass through the second or active fermentation more quickly, and become vinegar sooner than that which is made later.

Having good fruit, the next thing is to have it ground and pressed. At the larger mills where this is done, they have mills that will grind much more than the old mills with wooden rollers for crushing the fruit, which we often watched when a boy, and they have huge presses where hydraulic power or steam is used to squeeze out the juice from the pomace, which is put in and wrapped with cloth, so that it comes out in thin sheets instead of the large cheeses we knew then.

Whatever the process, however, it should be cleanly, as in preparing any other article of food. It used to be thought that in fermentation the cider worked off all impurities, and that any sort of filth might be allowed to go in before or during the grinding, but today we know that to get a pure article it must be pure from the start, and kept so, or the bacteria that are in it will multiply according to their kind, unchecked and undestroyed by fermentation.

A clean cask is needed to put it in. If an old cask is used that had cider or vinegar in it before, it should first be well soaked out, then rinsed out with water in which a handful of soda has been put, to sweeten it, then smoked inside by burning a rag that has been dipped in melted brimstone. Put this in the bung when the barrel stands on end, and when about half burned, reverse the barrel, that both ends may be well smoked. Put the bung in to retain the smoke or the sulphuric acid gas, which will form in the barrel, and do not remove the bung until ready to fill with cider, which will be all the cleaner and sweeter because of the sulphuring process. If new casks are used which have had liquor in them, they may be washed and rinsed as clean as the owner pleases, but the smoking is not needed, as most manufacturers burn the inside of their casks to a charcoal before they are filled, to prevent them absorbing too much of the liquor.

Strain the cider into the cask through straw, under which put one or more thicknesses of thick but not too closely woven bagging. The straw will catch the coarsest particles of pomace if any are pressed out,

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and the cloth the rest. When the barrel is taken home, remove the bung and allow it to work as much as it will, occasionally filling the barrel in the morning, as it works most during the day when it is warm, and may have settled in the night so that it would not overflow unless refilled. For this purpose a gallon or so should be kept beside that in the barrel. When fermentation is over, cover the bunghole with a bit wire mosquito netting to keep out flies and other insects, and to admit air if vinegar is wanted. If it is to be used as cider, stop it tightly and keep it so excepting a spile to admit air when drawing.

We have seen many receipts for keeping cider from changing to vinegar, which varied from adding liquor to the use of salicylic acid, but we never found any that improved the flavor of good cider from sound fruit treated as we have described. To hasten the change into vinegar the keeping the cellar or storeroom warm and dry is important, and we have known it to be done by adding a gallon of molasses and warm water in which was put a little yeast, say about two quarts of cheap molasses and one cake of compressed yeast dissolved in two quarts of water. The cheap molasses is specified because it usually sours quicker than a heavy molasses.

Some put in the "mother" that gathers in a barrel of old vinegar; others take a barrel partly filled with strong vinegar and add one or two gallons of the cider, and after a few days draw out as much from the vinegar barrel and again add cider. Another way is to air the cider by allowing small streams to run out into a tub, from which it is dipped back into the barrel, while some take the trouble to run it through barrels of hard-wood shavings, through which it works so slowly as to become thoroughly aerated and it sours rapidly. Even frequent shaking of a partly filled cask will hasten the souring.

In certain sections they boil down the cider as soon as it comes from the mill, and before the first fermentation begins, and make the apple jelly often seen in grocery stores, but the operation is a rather difficult one, to get it cooked just enough without scorching. Those who have the evaporators used in making maple sugar, and who are used to boiling the maple sap, succeed better in this than any one would be likely to with less perfect apparatus and less experience. It needs skimming often during the process, we believe, but we have not tried it nor watched the process.

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GRADING AND PACKING APPLES.

REQUIREMENTS OF THE APPLE SHIPPERS' ASSOCIATION OF THE UNITED STATES.

Standard Barrels.—Resolved, That this association recognizes as the standard barrel for apples a barrel which is of the capacity of a flour barrel, which is 17⅛ inches in diameter of head, and 28½ inches in length of stave, and bulge not less than 64 inches, outside measurement.

Requirements for No. 1 Apples.—Resolved, That the standard for size for No. 1 apples shall not be less than two and one-half inches in diameter and shall include such varieties as the Ben Davis, Willow Twig, Baldwin, Greening and other varieties kindred in size. That the standard for such varieties as Romanite, Russet, Winesap, Jonathan, Missouri Pippin and other varieties kindred in size shall not be less than two and one-quarter inches. And further that No. 1 apples shall be at time of packing practically free from the action of worms, defacement of surface or breaking of skin; shall be hand-picked from the tree, a bright and normal color and shapely form.

By-Law Establishing What a No. 2 Apple Shall Be.—The following, determining what a No. 2 apple shall be, was made a by-law of this association August 3, 1900, and appears among the by-laws.

No. 2 apples shall be hand-picked from the tree; shall not be smaller than two and one-quarter inches in diameter. The skin must not be broken or the apple bruised. This grade must be faced and packed with as much care as No. 1 fruit.

Packing Apples.—Remove one head and nail all hoops secure. Place carefully a row of choice apples; stem end down, average size, color and quality to be a fair sample of the contents of the balance of the barrel. Place the barrel on a solid platform or heavy board and proceed to fill carefully, shaking the same as you put in the fruit. The barrel should be shaken solid after each bushel of apples is put in. It will not do to set the barrel on the ground, as the idea of shaking is to make the contents as solid as possible. The barrel should be filled an inch above the chime after being shaken solid.

The bottom then should be pressed in with an apple press and fastened securely either by nailing or head lining, turned over and the name of the apple marked plainly on the faced end, as what was originally the bottom of the barrel is now the top and becomes the end opened and displayed when on sale.—Year Book, Apple Shippers' Association of the United States.

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THE SMALL APPLE PACKAGE.

Selling Problems.—What shall we do with our apples? This question was not asked by eastern fruit growers during the past season, but it is not necessary to look back far to see farmers hauling fine Spies or Baldwins four miles to market for 50 cents a barrel, which comes quite near to paying for the privilege of working. Such seasons of surplus are rare, yet the problem of how best to dispose of a large crop is often a difficult one. We may raise too many perishables, like peaches, pears, plums, grapes or small fruits, but the danger limit is far away for the production of that many-purpose, all-the-year fruit, the apple. In New York City, for instance, in flats and apartment houses, are hundreds of families who use but few apples. They scarcely know that there are such fruits as fine-grained Northern Spies, good and reliable, but slightly coarser Baldwins, and Bellflowers and Spitzenburgs, which, when baked or stewed, need no lemon or orange-peel trimmings. Here is a possible additional market for thousands of bushels of apples, right within arm's length of eastern fruit growers.

Smaller Package Needed.—The barrel is an excellent package, strong and easily handled, but it is too large for the city retail trade. Most city houses have no suitable place for storing this quantity of fruit. Many flats are so thoroughly occupied that were a barrel to appear at the door and insist on coming in the cat and child would have to run for the fire escape. Grocers and peddlers sell apples in the residence districts. The peddler's stock is usually a lot of culls, handled over and bruised until nearly worn out. The grocer buys medium-grade barreled apples and sells them in lots of two to four quarts, mixing in plenty of culls. With practically nothing but such wretched specimens of the apple tribe within reach, it is not strange that these people use few apples. What is required is a package small enough for the average city family to use before becoming stale. There is no better place to do this packing than where the fruit is grown or at the point of shipment. The less apples are handled the better they are. If packed on a farm where picked, and properly stored, there would be no need of any extra handling, and the consumer might actually get fruit with the bloom on, just as it came from the tree. Where this plan has been tried in a small way good results are reported. There is no doubt that when fruit growers get ready to put up their best apples uniformly and properly they will have no trouble in making connection with dealers in the city who will carefully carry out their end of the plan. Here is what Charles Forster, a New York apple man of wide experience in foreign and domestic trade, says:

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"For the higher grades of apples the box is the coming package. I believe no one will make a mistake by packing his best apples in this way. Our Spitzenburgs are selling as high as $3 to $3.50 per box. The relative value in barrels is about the same, but at these prices one would buy a box where he would not take a larger quantity, two-thirds of which might spoil before they could be used."

A Typical Box.—The inside dimensions are 20½x11x9¾ inches. This makes a cubic content of a trifle over an even bushel, and about six quarts less than a heaping bushel. The ends are three-fourths-inch material, and all four sides are one-fourth-inch hard pine. There is no partition, as in the orange box. The apples may be put in tightly, and the thin springy sides hold them without bruising. The box is put together with thirty-two rough wire nails 1¾-inch long. The chief advantages of this package are: Convenient size; strength, given by the solid ends and secure nailing; and springy sides, permitting the apples to be crowded in slightly and holding them firmly without bruising. Eastern fruit-growers' associations are becoming numerous and strong. This undeveloped city trade may be theirs if they will establish uniform, convenient packages, put on labels that shall become guarantees of quality, and work systematically to get the goods introduced. This trade will never be worked up by those who take a back seat and merely think about it. Get the fruit to the consumer's door, let him see what it is, and he will be glad to invite the boxed apple in and hand over his cash for it, for even at these extreme prices fancy boxed apples are no higher proportionately than many other food stuffs which he buys.—W. W. H.

A standard apple box has been adopted by the Inland Empire Horticultural Association of Washington. The box is to contain 2,241 cubic inches of space and will be made in two shapes in order to conform to the different varieties of apples. One size will be 10x11x20¼ inches inside measure and the other will be 10½x11x18 9-16 inches inside measurement. The official standard adopted by the association is slightly over a bushel. Each box of apples is to be branded "One bushel." The next Legislature will be urged to adopt such a standard by law, coupling therewith a penalty for using any other.—Rural New Yorker.

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